APPENDIX A
Health and Safety Plan

APPENDIX B
Project Health and Safety Plan (HSP)
Project Name: 160-Acre Parcel, Rialto, California
Project Number: HA0816

This HSP, which must be kept on site, addresses the safety and health hazards of each phase of site operation, including the requirements and procedures for worker protection. Only the Site Health and Safety Officer (SHSO) can change or amend this document in agreement with the Environmental Health and Safety Coordinator (EHSC), Project Manager, and Principal-in-Charge. The SHSO must initial any change made to the HSP at the relevant section. Major amendments (e.g., changes in personal protective equipment not provided for in this plan, addition of tasks, etc.) must be documented by indicating the amendment date shown on this page.

Prepared by: Phuong Ly, SHSO — 3/4/04 Date

Reviewed by: Misty Yanok - EHSC — 3/4/04 Date

Approved by: Karen Arteaga - Project Manager — 3/4/04 Date

Bert Palmer, Principal-in-Charge — 3/4/04 Date

Copy Cover Sheet to: EHSC

Brief Description of Amendment	Amendment Date

This HSP has been given to the following subcontractor(s) in accordance with OSHA 29 CFR 1910.1200 (Hazard Communication Standard):

Subcontractor: _____ Representative: _____ Date: _____

Subcontractor: _____ Representative: _____ Date: _____.

GeoSyntec site workers must read this HSP. A pre-entry briefing conducted by the SHSO must be held prior to initiating this project. All sections of this HSP must be reviewed during this briefing. Any worker not in attendance at the initial meeting must be trained by the SHSO on the information covered in the pre-entry briefing meeting. ***Tailgate meetings must be held at the beginning of the work shift by the SHSO to discuss important safety and health issues concerning tasks performed on that day. A brief description of topics discussed in tailgate meetings must be documented in the Field Logbook.*** After reading the HSP and attending a pre-entry briefing, workers must sign the following acknowledgment statement.

I have read, understand, and agree with the information set forth in this HSP. I have also attended a pre-entry briefing. I agree to perform my work in accordance with this HSP.

Name	**Date**	**Name**	**Date**

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ATTACHMENTS

REFERENCES

1. SITE/TASK DESCRIPTION

Brief description of site (including information as to current and previous site usage, location and approximate size of site, and a description of the tasks):

- Site Usage: From approximately 1952 through 1957, the Site was owned and occupied by West Coast Loading Corporation (WCLC). As reported in the 14 July 2003 Administrative Order for Remedial Investigation (the Order) issued by the United State Environmental Protection Agency (USEPA), WCLC activities at the Site consisted of the loading and assembly of munitions for the United States Army and United States Navy. From approximately 1957 through 1963, Goodrich operated at the Site. The Order alleges that Goodrich's operations included grinding oxidizers, mixing propellants, pouring propellant into motor casings and static-firing of solid propellant rocket motors (Paragraph 19 of the Order). The Order also alleges that various chemicals were used during Goodrich's operations, potentially including perchlorate and some volatile organic compounds (VOCs). Before and after Goodrich's tenure on the Site, the Site has been occupied by entities which utilized, possessed and / or disposed of perchlorate and perchlorate-containing materials.
- Site Location: 160-acre parcel bounded to the north by Casa Grande Park Avenue, Locust Avenue on the east, the extension of Alder Avenue on the west, and the extension of Summit Avenue on the south.
- Size of Site: Approximately 160 acres
- Expected Field Dates: Approximately April through June 2004

(Beginning date - ending date)

- Tasks for this project include:

① Utility marking and clearance for drilling and soil sampling locations;

② Mobilization and demobilization of labor, materials, and equipment to and from the Site;

③ Drilling of pilot borings, temporary well installation (including construction, development, groundwater sampling, and demolition), piezometer installation, well construction, surface well completion, development, and cleanup of monitor well locations, and drumming of investigation-derived waste;

④ Soil gas and soil sampling activities using direct-push or hollow-stem auger sampling equipment and drumming of soil cuttings;

⑤ Groundwater monitoring activities including water level measurements, purging, and groundwater sampling; and

⑥ Surveying activities.

- Description of Surrounding Property/Population:

North	Residential and light industrial	East	Light industrial
South	Heavy Industrial	West	Undeveloped

2. KEY PERSONNEL AND HEALTH AND SAFETY RESPONSIBILITIES

Table B-1 lists project personnel and their responsibilities in regard to health and safety concerns on this project.

3. WORKER TRAINING

Table B-2 documents that workers have received the appropriate training requirements according to the company Environmental, Health, and Safety (EH&S) Training Program. A pre-entry briefing and daily tailgate meetings also are conducted to facilitate on-site training.

4. SITE CONTROL

Site control procedures must be implemented **before** the start of site tasks to control worker exposures to hazardous substances.

4.1 Site Map

A site map is provided in Figure B-1. Changes may be made to the site map by the SHSO, as needed, based on site conditions. The site map will be posted in the work area.

4.2 Buddy System

APPLIES TO TASK ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥

The Buddy System is required in the task(s) indicated above. The buddy system includes maintaining regular contact (see Section 4.6) with on-site GeoSyntec personnel, clients and/or contractors.

In situations where task work does not require the buddy system, on-site personnel must have appropriate communication device(s) on his/her person(s), and shall maintain contact with office personnel, at a minimum, upon arriving at and departing from the site on a daily basis.

4.3 Work Zones

Three work zones will be established for each task. The Exclusion Zone is defined as the area onsite where contamination is suspected and tasks are to be performed. The Contamination Reduction Zone (CRZ) is defined as the area where equipment and workers are to be decontaminated. The Support Zone is defined as the command area and serves as a storage area for supplies. The exact location and extent of the work zones will be modified as necessary as site investigation information becomes available.

The boundaries of the Exclusion Zone, CRZ, and Support Zone must be marked using the following methods:

☐ Warning tape ☒ Traffic cones

☐ Signs ☐ Fence
☐ Other_____

4.3 Work Zones

Access to the site must be controlled using the following method:

☐ Sign in/Sign out log ☐ Guard
☐ Identification badges ☒ Other: As required by property owners/tenants.

4.5. Visitors

Visitors to the site must be continually escorted in order to assure their safety since they may be unfamiliar with the site. Visitors must not be allowed past the Support Zone unless they read, understand, sign, and meet the requirements outlined in this HSP.

4.6 Communications

On-site communications must be conducted through the use of:

☒ Verbal
☐ Two-way radio ☐ Horn
☐ Cellular telephone ☐ Siren
☐ Hand signals ☐ Other:_____

Off-site communications must be conducted through the use of:

☒ Cellular telephone
☐ Pay phone: Location _____
☐ Other: _____

4.7. Safe Work Practices

General Safe Work Practices that must be implemented during work activities at this site are included in Table B-3.

4.8. Inspections

For projects lasting longer than one week, the SHSO must conduct weekly health and safety inspections. The inspections must be documented using the Weekly Health & Safety Inspection checklist included in Attachment B-1. The Weekly Health & Safety Inspection Checklist must be kept on file at the project site.

5. HAZARD ANALYSIS AND MITIGATORS

Site specific hazards must be identified (through hazard analysis) to determine the appropriate safety and health hazard mitigators needed to protect workers from the identified hazards. Hazard analysis involves a complete review of chemical, physical, and biological hazards.

5.1 Chemical Hazards ☒ APPLICABLE ☐ NOT APPLICABLE

Site-specific chemical data documenting concentrations of the contaminants of concern (COCs) are not available. However, a list of monitoring parameters has been developed that includes constituents used historically at the Site over the past 50 years or more, on the basis of historical documents reviewed and interviews with former site personnel. Of this list, a subset of contaminants potentially may be present at concentrations 5 times the relevant standards (i.e., Maximum Contaminant Levels [MCLs] or Preliminary Remediation Goals [PRGs]) have been considered Contaminants of Concern as indicated in Table B-4. Contaminant Fact Sheets for each of the Contaminants of Concern for this project are provided in Attachment B-2.

Information from the Contaminant Fact Sheets (e.g., flash point, water reactive, etc.) has been utilized in performing the chemical hazard analysis in Table B-5 (e.g., fire, inhalation, reactivity, and skin absorption hazards). If, based on the hazard analysis, chemical hazards exist, hazard mitigators must be utilized to control these hazards (Attachment B-3). In addition, air monitoring equipment (Section 6) and personal protective equipment (Section 8) must also be utilized to evaluate airborne concentrations and protect workers.

5.2 Physical Hazards ☒ APPLICABLE ☐ NOT APPLICABLE

Physical hazards associated with tasks to be performed (e.g., electrocution due to drilling, etc.) and site location (e.g., slips, trip, or falls due to rocky terrain, etc.) have been analyzed in Table B-5. Physical hazards may include weather related issues such as rain, temperature, and wind at the site. High winds may be encountered at the site and these can cause hazards that may affect Site personnel health and safety. If, based on the hazard analysis, physical hazards exist, hazard mitigators (Attachment B-3) must be implemented.

5.3 Biological Hazards ☒ APPLICABLE ☐ NOT APPLICABLE

If, based on the hazard analysis (Table B-5), biological hazards exist associated with tasks to be performed and site location (e.g., allergic reactions to poisonous plants or insects indigenous to the area, etc.), hazard mitigators (Attachment B-3) must be implemented.

6. AIR MONITORING

6.1 Real-Time Air Monitoring ☒ APPLICABLE ☐ NOT APPLICABLE

The types of air monitoring equipment required, initial frequency of readings, and action guidelines for each task are provided in Attachment B-4. Action guidelines for contaminant vapor(s) and particulate matter are based on the hazard analysis (Section 5) and an analysis of any previous sampling results. Consideration is also given to vapor density and carcinogenicity where applicable.

Frequency of air monitoring readings will be adjusted on site accordingly, with the consent of the SHSO. Equipment must be calibrated at least before work begins each day and at the end of the day. Air monitoring readings and calibration records must be documented in the Field Logbook.

6.2 Personal/Area Air Monitoring ☐ APPLICABLE ☒ NOT APPLICABLE

Personal/area air monitoring is required for the following contaminants of concern:

7. MEDICAL SURVEILLANCE

Table B-2 indicates the workers who participate in the company Medical Surveillance Program.

☐ **Yes** ☒ **No** Additional project-specific medical surveillance is required for the site-specific contaminants of concern.

8. PERSONAL PROTECTIVE EQUIPMENT

☒ APPLICABLE ☐ NOT APPLICABLE

The levels of personal protection required for each task are provided in Attachment B-5. Required equipment and types of protective clothing materials are listed, as well as an indication of the initial level of protection. The level of protection may be upgraded or downgraded (by the SHSO) based on the action guidelines provided in Attachment B-4. PPE levels must be indicated in the Field Logbook.

Basic PPE in Site areas will consist of hard hats, safety glasses, and safety boots/shoes.

If respirators are worn, workers must adhere to the company's Respiratory Protection Program (29 CFR §1910.134). Table B-2 provides a record of the site workers' last annual fit test. Beards (i.e., facial hair interfering with the respirator seal) are not allowed.

9. DECONTAMINATION ☒ APPLICABLE ☐ NOT APPLICABLE

PPE must be decontaminated as per 29 CFR §1910.120(k). The decontamination procedures, equipment and decontamination solution required for each task are provided in Attachment B-6. In an emergency, the primary concern is to prevent the loss of life or severe injury to site personnel. If immediate medical treatment is required to save a life, decontamination should be delayed until the victim is stabilized. If decontamination can be performed without interfering with essential life-saving measures or first aid, or if worker has been contaminated with an extremely toxic or corrosive material that could cause severe injury or loss of life, decontamination must be performed in coordination with or prior to initial medical treatment at the scene.

10. EMERGENCY PREPAREDNESS AND RESPONSE

A list of contacts and telephone numbers for the applicable local off-site emergency responders is provided in Table B-6. The nature of the site work and contaminants of concern should be reviewed with the off-site responders before work begins on this project. The following emergency response equipment is required for this project:

☒ Fire Extinguisher: ☐ Type A ☐ Type B ☐ Type C ☒ Type ABC
☒ Eyewash (Note: 15 minutes of free-flowing fresh water)
☐ SCBA
☒ First Aid Kit
☐ Shower (Note: for acids and caustics)
☐ Other:_____

The emergency response communication system for the site is:

☒ Verbal
☐ Two-way radio
☐ Hand signals: Hand gripping throat ="Out of Air, Can't Breathe"
Grip partner's wrist or both hands around waist ="Leave area immediately"
Hands on top of head ="Need assistance"
Thumps up ="OK; I am all right; I understand"
Thumps down ="No; negative"
☐ Horn
☐ Siren
☐ Other_____

In the event that an on-site emergency develops, the procedures delineated in Table B-7 are to be followed immediately.

11. CONFINED SPACE ENTRY ☐ APPLICABLE ☒ NOT APPLICABLE

The task(s) for this project do not involve confined-space entry. If confined space entry becomes necessary, workers must adhere to the company's Confined Space Entry Program [29 CFR §1910.120(j)].

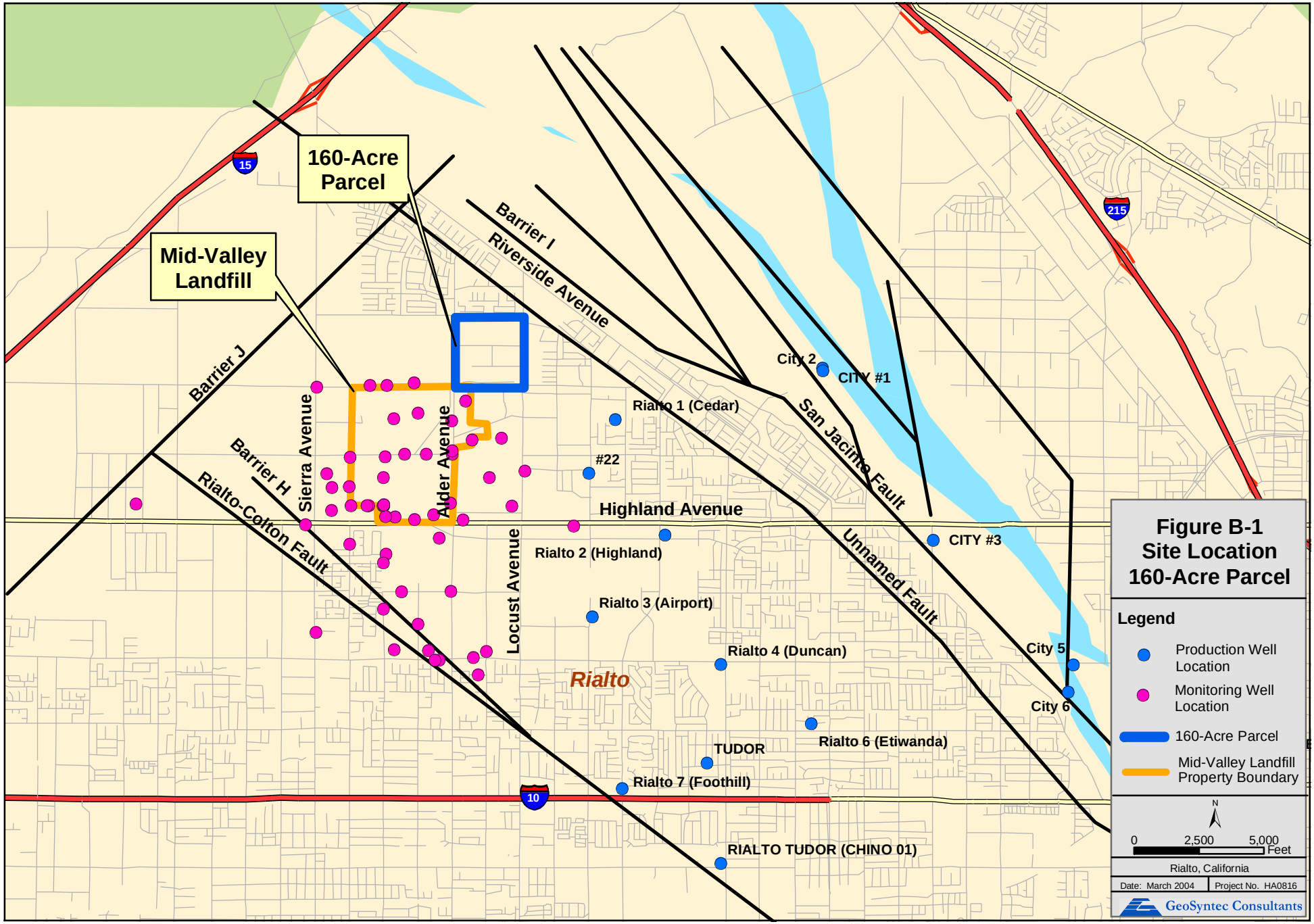
12. SPILL CONTAINMENT ☒ APPLICABLE ☐ NOT APPLICABLE

The task(s) for this project involve drilling, drum/container sampling, excavation, transportation, well sampling, and soil gas and soil sampling. Workers must adhere to the hazard mitigators for drilling, soil gas, soil, and groundwater sampling, and drum handling in Attachment B-3.

13. HAZARD COMMUNICATION ☒ APPLICABLE ☐ NOT APPLICABLE

The following procedures must be followed for chemicals brought on site (i.e., decontamination solution, sampling preservatives, etc.):

- Labels on incoming primary chemical containers must not be defaced.
- Chemical containers must be stored in appropriate storage containers.
- Secondary containers and storage containers must be correctly and clearly labeled using the Hazardous Materials Identification System (HMIS).
- Incompatible chemicals must not be stored together.
- Workers have received training on the hazards of these chemicals as indicated in Table B-2.
- A Material Safety Data Sheet (MSDS) for each chemical must be included in Attachment B-7.
- When chemicals are used on site, workers must adhere to the company's Hazard Communication Program (29 CFR §1910.1200).



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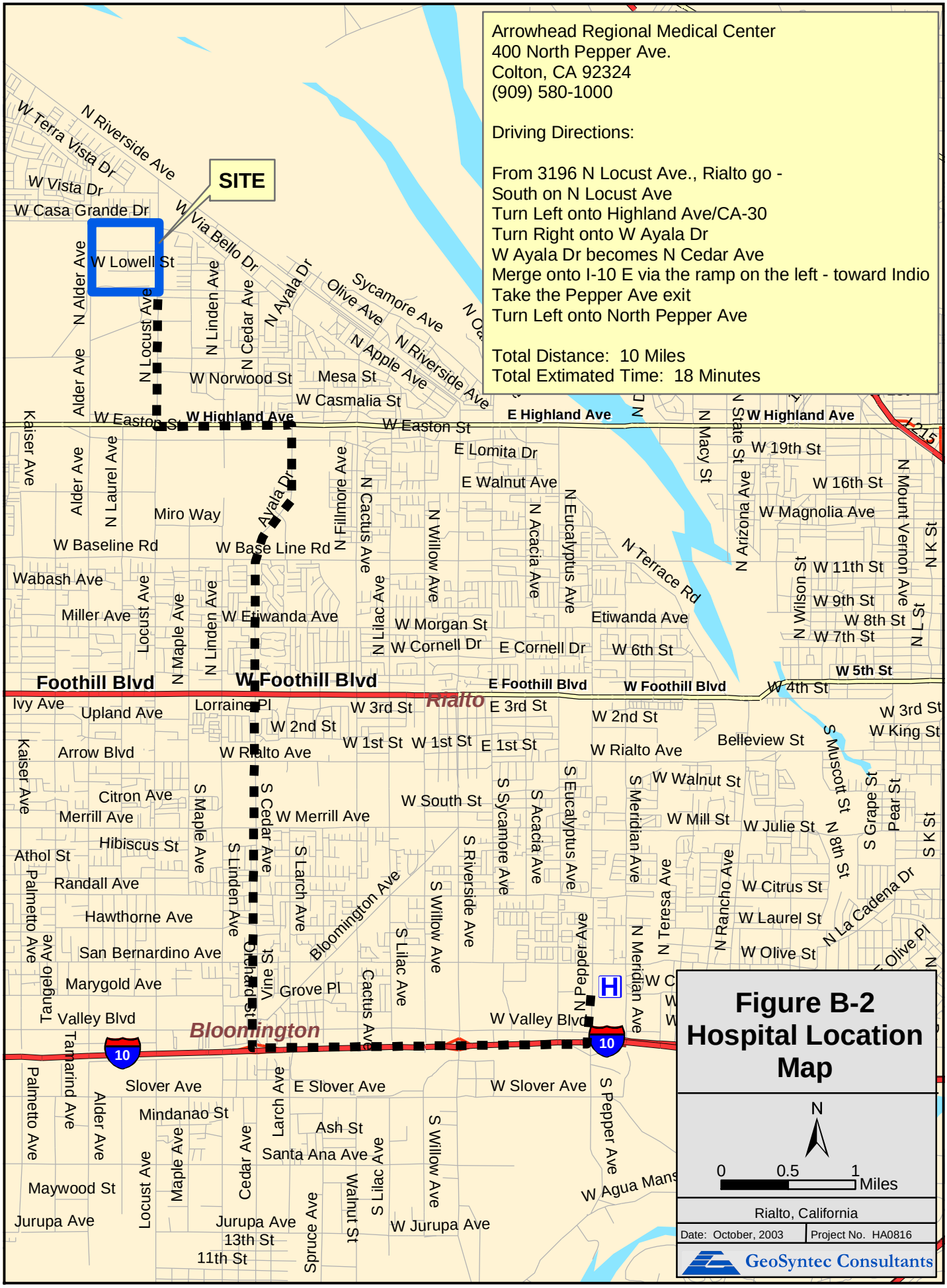

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Table B-1
Key Personnel and Health & Safety Responsibilities

Principal-in-Charge ***Bert Palmer, PhD, PE***	*Project Manager (PM)* ***Karen Arteaga, PE***	*Site Health & Safety Officer (SHSO)* ***Cathy Lash or Phuong Ly***	*Project Personnel* ***See Table B-2***	*Environmental, Health & Safety Coordinator (EHSC)* ***Misty Yanok***
• Approve this HSP and amendments, if any. • Ultimately responsible that elements of this HSP are implemented.	• Approve this HSP and amendments, if any. • Monitor the Field Logbooks for health and safety work practices employed. • Coordinate with SHSO so that emergency response procedures are implemented. • Verify corrective actions are implemented. • See to it that personnel receive this plan, are aware of its provisions, are aware of the potential hazards associated with site operations, are instructed in safe work practices, are familiar with emergency response procedures, and that this is documented. • Provide for appropriate monitoring, personal protective equipment, and decontamination materials.	Prepare and implement project (HSP) and amendments, if any, and report to the Project Manager for action if any deviations from the anticipated conditions exist, and authorize the cessation of work if necessary. • Confirm that site personnel meet the training and medical requirements. • Conduct pre-entry briefing and daily tailgate safety meetings. • Verify that monitoring equipment and personal protective equipment is operating correctly according to manufacturer's instructions and such equipment is utilized by on-site personnel. Calibrate or verify calibration of monitoring equipment and record results. • Verify that decontamination procedures are being implemented. • Implement site emergency response and follow-up procedures. • Notify the EHSC in the event an emergency occurs. • Performs weekly inspections	• Provide verification of required health and safety training and medical surveillance prior to arriving at the site. • Notify the SHSO of any special medical conditions (e.g., allergies). • Attend pre-entry briefings and daily tailgate safety meetings. • Immediately report any accidents and/or unsafe conditions to the SHSO. • Be familiar with and abide by the HSP. • Individuals are responsible for their own safety.	• Review and audit HSP and amendments • Maintain a copy of the cover sheet of each completed HSP. • Notify Director of Environment, Health & Safety in the event an emergency occurs. • Assist with the implementation of the corporate health and safety program. • Consult on health and safety issues.

Table B-2
Training / Medical Surveillance / Respirator Fit Test Records

Name	*EH&S Category*	*Initial 40-Hour*	*Initial 24-Hour (if app.)*	*Annual 8-Hour Refresher*	*8-Hour Supervisor (if app.)*	*CPR/ First Aid[1] (initial or refresher)*	*Medical Surveillance[2]*	*Annual Respirator Fit Test[3] (if app.)*	*Other:[4]*
		Date	*Date*	*Date*	*Date*	*Date*	*Date*	*Date*	*Date*
Karen Arteaga	2	1/31/97		8/21/03	3/7/98	3/8/04	11/19/02	11/25/97	
Walt Grinyer	2	Not Available		2/18/04	2/16/04	3/20/03	2/11/03	Not Available	
Ken Kitchings	1	5/12/90		8/21/03	3/13/93	3/20/03	6/19/03	Not Available	
Rich Kraft	2	Not Available		2/18/04	3/13/93	3/28/00	5/17/02	4/7/00	
Cathy Lash	1	6/4/99		8/21/03	7/11/00	12/18/03	10/7/03	7/27/99	
Carl Lenker	1	11/6/03		Not Applicable	2/16/04	3/8/04	10/3/03	9/25/03	
Phuong Ly	1	6/15/98		2/18/04	6/8/01	3/17/04	5/22/03	3/25/03	
Dean Mitchell	1	9/17/93		2/18/04	2/16/04	1/10/02	1/22/04	Not Available	
Duygu Tokat	1	9/11/03		Not Applicable	2/16/04	3/18/04	9/12/03	9/25/03	

Footnotes:

1 CPR Refresher: every year; First Aid Refresher: every three years.

2 Annual Medical Surveillance for EH&S Category I, Biannual Medical Surveillance for EH&S Categories II & III.

3 For EH&S Categories I & II only.

4 Could include task-specific training, project-specific training, or project-specific medical surveillance.

Table B-3
General Safe Work Practices

- Minimize contact with excavated or contaminated materials. Do not place equipment on the ground. Do not sit or kneel on potentially contaminated surfaces.
- Smoking, eating, or drinking after entering the work zone and before decontamination must not be allowed. Use of illegal drugs and alcohol are prohibited. Workers taking prescribed medication that may cause drowsiness should not be operating heavy equipment, and should be prohibited from performing tasks where Level C, B, or A personal protective equipment is required.
- Practice good housekeeping. Keep everything orderly and out of potentially harmful situations.
- Use of contact lenses on-site must not be allowed when dictated by working conditions.
- The following conditions must be observed when operating a motor vehicle.
  - Wearing of seat belts is mandatory
  - During periods of rain, fog, or other adverse weather conditions, the use of headlights is mandatory
  - A backup warning system or use of vehicle horn is mandatory when the vehicle is engaged in a backward motion
  - All posted traffic signs and directions from flagmen must be observed
  - Equipment and/or samples transported in vehicles must be secured from movement
  - The use of GeoSyntec acquired vehicles by non-GeoSyntec personnel is prohibited
- In an unknown situation, always assume the worst conditions.
- Be observant of your immediate surroundings and the surroundings of others. It is a team effort to notice and warn of impending dangerous situations. Withdrawal from a hazardous situation to reassess procedures is the preferred course of action.
- Conflicting situations may arise concerning safety requirements and working conditions and must be addressed and resolved rapidly by the SHSO and PM to relieve any motivations or pressures to circumvent established safety policies.
- Unauthorized breaches of specified safety protocol must not be allowed. Workers unwilling or unable to comply with the established procedures must be discharged.

Table B-4
Contaminants of Concern

Contaminant	*Medium*[1]	*Maximum Concentration*[2]	*EPA National Primary Drinking Standard*[3]	*EPA Soil Screening Level*[4]
Perchlorate	Groundwater	1,000 ug/L	18 ug/L	NA
Trichloroethylene	Groundwater	30 ug/L	5 ug/L	NA

Footnotes:

1 Indicate type of medium (i.e. soil, water, sludge, etc.).

2 Indicate the maximum concentration detected for the contaminant. Indicate liquids in µg/l and solids in mg/kg.

3 Site-specific groundwater data are not available. Data from investigations at and downgradient of a neighboring site (Mid-Valley Sanitary landfill) have been used for the above concentrations. Only contaminants expected to exceed 5 times the USEPA or State of California Primary Drinking Water Standard for the contaminant are entered onto the table.

4 Site-specific soil data are not available. Data from investigations at a neighboring site (Mid-Valley Sanitary landfill) have been used for the above concentrations. For solids, only contaminants expected to exceed 5 times the USEPA Soil Screening Level for the contaminant are entered onto the table.

Table B-5
Hazard Analysis

TASKS			
①	Utility Clearance/Marking	④	Soil Gas and Soil Sampling
②	Mobilization/Demobilization	⑤	Groundwater Monitoring
③	Drilling Pilot Borings, Well Installation	⑥	Surveying

	①	②	③	④	⑤	⑥
I. Chemical Hazards						
Fire	✓	✓	✓	✓	✓	✓
Inhalation			✓	✓	✓	
Reactivity			✓	✓	✓	
Skin absorption			✓	✓	✓	
II. Physical Hazards						
Backhoe				✓		
Boating						
Cold Stress						
Compressed Gas Cylinder						
Drilling			✓	✓		
Drum Handling			✓	✓	✓	
Electrocution			✓	✓		
Excavation/Trenching						
Eye Injury			✓	✓	✓	
Hand/Foot Injury			✓	✓	✓	
Heat Stress			✓	✓	✓	
Heavy Equipment			✓	✓	✓	
Lifting Heavy Loads			✓	✓	✓	
Noise			✓	✓	✓	
Portable Power/Hand Tool					✓	
Radiation Exposure						
Slipping/Tripping/Falling	✓	✓	✓	✓	✓	✓
Thoroughfares			✓	✓	✓	
Other:						
III. Biological Hazards						
Allergic Reaction to Poisonous Plants	✓	✓	✓	✓	✓	✓
Dogs	✓	✓	✓	✓	✓	✓
Insect/Vermin/Snake Bites	✓	✓	✓	✓	✓	✓
KB-1 Injection Into Groundwater						
Medical Waste						
Other:						

Instructions: For each task, place an "X" in the blank corresponding to associated hazards.

Table B-6
Emergency Response Contacts

Name	***Telephone Numbers***		***Date of Pre-Emergency Notification***
	Office	***Alternative***	
Fire Department	911	911	
Hospital – Arrowhead Regional Medical Center	(409) 580-1000	911	
Police Department	911	911	
Branch Office Manager – *Karen Arteaga*	(626) 449-0664	(818) 497-5552	
Corporate Human Resources Manager –- *Mary Masty*	(561) 995-0900	(954) 802-7498	
Project Manager – *Karen Arteaga*	(626) 449-0664	(818) 497-5552	
Principal-in-Charge – *Bert Palmer*	(714) 969-0800 x232	(714) 335-5948	
Environmental, Health & Safety Coordinator – *Misty Yanok*	(714) 969-0800 x247	Mobile (714) 501-3322	
Director of Environment, Health & Safety –- *Jack C. Peng, Ph.D., C.I.H.*	Mobile (925) 788-6828	Mobile (925) 788-6828	
EPA (if applicable)			
State EPA (if applicable)			
Other			
Other			

* To be completed before site activities are initiated.

WRITTEN DIRECTIONS TO HOSPITAL (Figure B-2):

From 3196 N Locust Ave., Rialto go -

South on N Locust Ave

Turn Left onto Highland Ave/CA-30

Turn Right onto W Ayala Dr

W Ayala Dr becomes N Cedar Ave

Merge onto I-10 E via the ramp on the left - toward Indio

Take the Pepper Ave exit

Turn Left onto North Pepper Ave

Table B-7
Emergency Response Procedures

- The SHSO (or alternate) should be immediately notified via the on-site communication system. The SHSO assumes control of the emergency response.
- The SHSO notifies the PM, Principal-in-Charge, and the EHSC of the emergency. The EHSC must then contact the Director of Environment, Health & Safety. If a GeoSyntec employee is injured, the SHSO must contact the worker's Branch Office Manager immediately. If the Branch Office Manager can not be contacted, then the Corporate Human Resources Department must be notified.
- If applicable, the SHSO must notify off-site emergency responders (i.e., fire department, hospital, police department, etc.) and must inform the response team as to the nature and location of the emergency on site.
- If applicable, the SHSO evacuates the site. Site workers should move to their respective refuge stations using the evacuation routes provided on the Site Map.
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs, should be donned.
- If chemicals are accidentally spilled or splashed into eyes or of skin, use eyewash and/or shower.
- Before continuing site operations after an emergency involving toxic gases, the SHSO will don a SCBA and utilize appropriate air monitoring equipment to verify that the site is safe.
- An injured worker must be decontaminated appropriately.
- If a worker is injured, first aid will be administered by workers certified in first aid.
- After the response, the SHSO must complete accident investigation reports obtained from the Branch Office Manager.

Attachment B-1

Weekly Health & Safety Inspection Checklist

Project: _____ Date: _____

Inspected by: _____

Category	***Observations/Corrective Actions (N/A, if Not Applicable)***
Pre-entry briefing records are current	
Tailgate meeting records are current	
Training/medical surveillance/respiratory protection records are current	
Site map is posted	
Buddy system is implemented	
Work zones are identified	
Site access is controlled	
Visitors are being escorted	
On-site/off-site communications are in working order	
Safe work practices are being implemented	
Any additional hazards incurred?	
Air monitoring equipment is in working condition	
Air monitoring records are being recorded in field logbook	
Air monitoring calibration records are being recorded in field logbook	
PPE storage area is neat and organized	
Standard operating procedures are being implemented	
Housekeeping at decontamination zone is appropriate	
Decontamination procedures are being implemented	
Emergency response equipment is in working condition	
Route to hospital is posted	
Confined space entry program is being implemented	
Spill containment equipment is available	
Chemical inventory is up to date	
Material safety data sheets are available	
Primary and secondary containers are properly labeled	
Housekeeping at the chemical storage area is appropriate	

Attachment B-2

Contaminant Fact Sheet Directory

Included in HASP	*Chemical Name*	*Synonyms*	*Document Number*
☐	Acetone	Dimethyl Ketone; Ketone propane; 2-Propanone	GA971212
☐	Aldrin	HHDN; Octalene	GA980283
☐	Aniline	Aminobenzene; Aniline Oil; Benzeneamine; Phenylainine	GA980093
☐	Arsenic	Arsenic metal; Arsenia	GA981097
☐	Benzene	Benzol; Phenyl hydride	GA970125
☐	Bis(2-ethylhexyl)phthalate	Di(2-ethylhexyl)phthalate	GA970207
☐	Cadmium	Cadmium metal	GA970126
☐	Carbon disulfide	Carbon bisulfide	GA970832
☐	Chlorobenzene	Benzene chloride; Chlorobenzyl; MCB; Phenyl chloride	GA970127
☐	Chloroform	Methane trichloride; Trichloromethane	GA970128
☐	Chromic Acid	Chromic anhydride; Chromium trioxide	GA980758
☐	Chromium	Chromium metal	GA970129
☐	Copper	Copper metal dusts; Copper metal mists	GA980756
☐	2,4-D	Dichlorophenoxyacetic acid	GA971255
☐	DDT	p,p-DDT; Dichlorodiphenyltrichloroethane; 1,1,1-Trichloro-2-2-bis(p-chlorophenyl)ethane	GA980284
☐	1,2-Dichlorobenzene	O-DCB; Orthodichlorobenzene	GA970130
☐	1,2-Dichloroethane	Ethylene dichloride; Glycol dichloride	GA970954
☐	1,2-Dichloroethylene	1,2-Dichloroethene; (cis, trans, or sym-) Acetylene dichloride	GA970953
☐	1,2-Dichloropropane	Propylene dichloride; Dichloro-1,2-propane	GA970131
☐	2,4-Dinitrotoluene	Dinitrotoluene; DNT; Methyldinitrobenzene	GA990071
☐	Endosulfan	Benzoepin; Endosulphan ; Thiodan	GA971257
☐	Ethylbenzene	Ethylbenzol; Phenylethane	GA970132
☐	Ethylene Dibromide	EDB; 1,2-Dibromoethane, Ethylene bromide, Glycol dibromide	GA980285
☐	Gasoline	Motor fuel; Motor spirits; Natural gasoline; Petrol	GA970833
☐	Hexachloroehtane	Carbon hexachloride; Ethane hexachloride; Perchloroethane	GA971252

Attachment B-2

Contaminant Fact Sheet Directory
(continued)

Included in HASP	*Chemical Name*	*Synonyms*	*Document Number*
☐	Hydrochloric Acid	Anhydrous hydrogen chloride; Aqueous hydrogen chloride; Muriatic acid	GA980757
☐	Hydrogen Sulfide	Hydrosulfuric acid; Sewer gas; Sulfuretted hydrogen	GA980399
☐	Isophorone	Isoacetophorone; 3,5,5-Trimethyl 2- cyclohexenone	GA971253
☐	Isopropanol	Isopropyl alcohol; IPA; 2-Propanol	GA970133
☐	Lead (inorganic)	Lead metal	GA970134
☐	Mercury	Colloidal mercury; Metallic mercury; Quicksilver	GA970135
☐	Methane	Fire damp; March gas; Methyl hydride	GA970834
☐	Methoxyclor	P,p-Dimethoxydiphenyl/trichlorethane; DMDY	GA971256
☐	2-Methylphenol	Ortho-Cresol; 2-Cresol; O-Cresylic Acid; 1-Hydroxy-2-Methlbenzene; 2-Hydroxytoluene	GA980091
☐	Methyl ethyl ketone	2-Butanone; MEK; Methyl acetone	GA970136
☐	Methyl chloroform	1,1,1-Trichloroethane	GA970137
☐	Methylene chloride	Dichloromethane; Methylene Dichloride	GA970138
☐	Naphthalene	Naphthalin; Tar Camphor; White Tar	GA970139
☐	Nickel	Nickel catalyst	GA980759
☐	Nitroaniline	Para-aminonitrobenzene; 4-Nitroanline; 4-Nitrobenzenamine; p-Nitrophenylamine, PNA	GA980094
☐	Nitrobenzene	Essence of mirbane; Nitrobenzol; Oil of mirbane	GA980095
☐	Pentachlorophenol	PCP; Penta; 2,3,4,5,6-Pentachlorophenol	GA970140
☒	Perchlorate		
☐	Phenol	Carbonic acid; Hydroxybenzene; Monohydroxybenzene; Phenol alcohol; Phenyl hydroxide	GA971250
☐	Phosgene	Carbonyl chloride; Carbon oxychloride; Chloroformyl chloride	GA990069
☐	Polychlorinated biphenyls (54%)	PCBs; Chlorodiphenyl	GA970141
☐	Silver	Silver metal; Argentum	GA970142
☐	2,4,5-T	2,4,5-Trichlorophenoxyacetic acid	GA971254
☐	Tetrachloroethylene	Tetrachloroethylene; Perchlorethylene; Perk	GA971274

Attachment B-2

Contaminant Fact Sheet Directory
(continued)

Included in HASP	*Chemical Name*	*Synonyms*	*Document Number*
☐	o-Toluidene	2-Methybenzeneamine; O-Aminotoluene; 1-Methyl-2-aminobenzene; O-Methylaniline; 2-Methylaniline, ortho-Toluidine	GA980096
☐	Toluene	Methyl benzene; Methyl benzol	GA970143
☐	Toluene-2,4-Diisocyanate	TDI; 2,4-TDI; 2,4-Toluene diisocyanate	GA990070
☐	Toxaphene	Chlorinated camphene	GA970153
☐	1,1,2-Trichloroethane	Ethane trichloride; B-Trichloroethane; Vinyl trichloride	GA971249
☐	1,2,4-Trichlorobenzene	Trichlorobenzene; 1,2,4-Trichlorobenzel	GA971251
☒	Trichloroethene	Trichloroethylene; TCE	GA970145
☐	Trichlorofluoromethane	Fluorotrichloromethane; Freon II	GA970144
☐	1,2,3-Trichloropropane	Allyl trichloride, Glycerol trichorohydrin, Glyceryl trichlorohydrin; Trichlorohydrin	GA980286
☐	Vinyl chloride	Chloroethene; VC; VCM	GA970146
☐	Xylene (Mixed Isomers)	o-xylene; p-xylene; m-xylene	GA970147

MSDS - AMMONIUM PERCHLORATE

==========

Ingredients/Identity Information

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Proprietary: NO
Ingredient: AMMONIUM PERCHLORATE
Ingredient Sequence Number: 01
Percent: 99.5MIN
NIOSH (RTECS) Number: SC7520000
CAS Number: 7790-98-9
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: 5MG/CUM,AS RESP DUST

==========

Physical/Chemical Characteristics

==========

Appearance And Odor: ODORLESS WHITE GRANULAR CRYSTALS.
Melting Point: 842F/450C
Specific Gravity: 1.95
Decomposition Temperature: >150F,>66C
Solubility In Water: APPRECIABLE
Magnetism (Milligauss): N/P
Corrosion Rate (IPY): UNKNOWN

==========

Fire and Explosion Hazard Data

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Flash Point Method: N/P
Extinguishing Media: WATER SPRAY, FOAM.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA IN AN ENCLOSED
AREA.
Unusual Fire And Expl Hazrds: COOL W/WATER FOR LARGE FIRE IN STORAGE AREA,
USE UNMANNED HOSE HOLDER OR WITHDRAW & LET BURN! SEE SUP

==========

Reactivity Data

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Stability: NO
Cond To Avoid (Stability): STABLE BELOW 150 F.DECOMP OR EXPLODES AT HIGHER
TEMP.
Materials To Avoid: COMBUSTIBLES,OXIDIZERS CREATE EXTREME FIRE/EXPL HAZARD.
Hazardous Decomp Products: VAPORS OF CHLORINE,HYDROGEN CHLORIDES, AMMONIA,OXIDES OF NITROGEN.
Hazardous Poly Occur: NO

Health Hazard Data

LD50-LC50 Mixture: 4200 MG/KG(RAT) & 1900MG/KG (RABBIT)
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE:MILD IRRITANT TO THE SKIN,EYES,MUCOUS
MEMBRANES,RESPIRATORY OR G.I. TRACT,REDNESS OF EYES AND SKIN. CHRONIC:SKIN,
G.I. OR RESPIRATORY DISORDERS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: PER MSDS DATA.
Signs/Symptoms Of Overexp:
EYE:IRRT,REDNESS.SKIN:IRRT,REDNESS.INHL:URT
IRRT.INGEST: GI TRACT IRRT,DIARR.
Med Cond Aggravated By Exp: PRE-EXISTING CONDITIONS MAY BE WORSEN.
Emergency/First Aid Proc: INHAL:RMV TO FRESH AIR. IF NOT BRTHNG GIVE CPR;
IF BRTHNG DIFF GIVE OXYGEN. EYE:IMMED FLUSH W/PLENTY OF WATER. SKIN: WASH
W/SOAP&WATER. RMV CONTAM CLTHG&SHOES. INGEST:INDUCE VOMIT. RPT UNTIL VOMIT
IS CLEAR. NOTHG BY MOUTH IF UNCONSC. GET MEDICAL ATTN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SCOOP UP OR ABSORB WITH NONCOMBUSTIBLE ABSORBENT(VERMICULITE).

Waste Disposal Method: EPA HAZWASTE D001. DISPOSE AS HAZWASTE IAW ALL LAWS
& REGS.
Precautions-Handling/Storing: DO NOT ALLOW CONTACT W/COMBUSTIBLE MATERIALS.STORE IN ORIGINAL CLOSED CONTAINERS.HANDLE CONTAINERS CAREFULLY.
AVOID INHL DUST & EYE/SKN CONTACT.
Other Precautions: PROVIDE WATER FILLED JUMP TANK OR SAFETY SHOWER.WASH
CONTAM CLOTHING PROMPTLY

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Control Measures

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Respiratory Protection: USE NIOSH/MSHA APPROVED RESPIRATOR FOR DUST IF
ABOVE PEL/TLV.
Ventilation: LOCAL OR GENERAL AS REQD.
Protective Gloves: IMPERVIOUS
Eye Protection: SAFETY GLASSES OR GOGGLES
Other Protective Equipment: WEAR PROTECTIVE CLOTHING, RUBBER BOOTS. DO NOT
WEAR LEATHER.
Work Hygienic Practices: AVOID CONTACT WITH EYES AND SKIN;DO NOT BREATHE
DUST/MIST;KEEP FROM CONTACT WITH CLOTHING & OTHER COMBUSTIBLE MATERIAL.
Suppl. Safety & Health Data: .

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Transportation Data

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Trans Data Review Date: 87075
DOT PSN Code: ASD
DOT Proper Shipping Name: AMMONIUM PERCHLORATE
DOT Class: 5.1
DOT ID Number: UN1442
DOT Pack Group: II
DOT Label: OXIDIZER
IMO PSN Code: AZZ
IMO Proper Shipping Name: AMMONIUM PERCHLORATE
IMO Regulations Page Number: 5126
IMO UN Number: 1442
IMO UN Class: 5.1

IMO Subsidiary Risk Label: -
IATA PSN Code: BQC
IATA UN ID Number: 1442
IATA Proper Shipping Name: AMMONIUM PERCHLORATE
IATA UN Class: 5.1
IATA Label: OXIDIZER
AFI PSN Code: BQC
AFI Prop. Shipping Name: AMMONIUM PERCHLORATE
AFI Class: 5.1
AFI ID Number: UN1442
AFI Pack Group: II
AFI Label: OXIDIZER
AFI Special Prov: A9
AFI Basic Pac Ref: 9-10
==========

Disposal Data

==========
Disposal Data Review Date: 88229
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: MSDS DTD JUN85.FIRE(CONT):EVACUATE AREA,DENY
ENTRY.USE SCBA PP MODE, FULL PROTECTIVE CLOTHING. IN CASE OF ACCIDENTAL
EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: D001
1st EPA Haz Wst Name New: IGNITIBLE
1st EPA Haz Wst Char New: IGNITABILITY
1st EPA Acute Hazard New: NO
2nd EPA Haz Wst Code New: D003
2nd EPA Haz Wst Name New: REACTIVE
2nd EPA Haz Wst Char New: REACTIVITY
2nd EPA Acute Hazard New: NO
==========

Label Data

==========
Label Required: YES
Technical Review Date: 10JAN91
Label Date: 01JUN85
MFR Label Number: UNKNOWN

Label Status: M
Common Name: AMMONIUM PERCHLORATE
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-Severe: X
Special Hazard Precautions: ACUTE-MINOR IRRITANT TO
EYE,SKIN,RESPIRATORY &
GI TRACT.CHRONIC-SKIN,GI OR RESPIRATORY DISORDERS.STORAGE-
DANGER!STRONG
OXIDIZER-CONTACT WITH COMBUSTIBLE OR OXIDIZABLE MATERIAL
CONSTITUTES AN
EXTREME FIRE & EXPLOSION HAZARD.CONTAMINATED CLOTHING &
ORGANIC METERIALS
ARE DANGEROUSLY FLAMMABLE.ALWAYS HAVE A WATER FILLED JUMP
TANK OR DELUGE
SHOWER NEARBY.IF YOUR CLOTHING CATCHES FIRE,DON'T USE A FIRE
BLANKET.USE
THE JUMP TANK OR DELUGE SHOWER.DON'T WEAR LEATHER
MATERIALS.STORE
CONTAINERS TIGHTLY CLOSED.FIRST AID-CALL A DOCTOR.EYE:FLUSH
W/WATER FOR 15
INDUCE VOMITING.GIVE WATER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y

MSDS Number: **P5983** * * * * * *Effective Date:* ***11/02/01*** * * * * * *Supercedes:* ***11/17/99***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker®

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

POTASSIUM PERCHLORATE

1. Product Identification

Synonyms: Perchloric acid, potassium salt; Potassium hyperchloride
CAS No.: 7778-74-7
Molecular Weight: 138.55
Chemical Formula: KCl04
Product Codes: 3220

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Potassium Perchlorate	7778-74-7	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES SEVERE IRRITATION TO EYES, SKIN AND RESPIRATORY TRACT. AFFECTS KIDNEYS AND BLOOD.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Yellow (Reactive)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. High concentrations can cause pulmonary edema. Absorption through inhalation of dust can produce systemic effects paralleling those from ingestion exposure.

Ingestion:
Irritant to mucous membrane; causes gastro-intestinal upset, and larger doses can cause nausea, vomiting, fever, rashes. Reduces oxygen to body organs (methemoglobinemia) causing the lips and skin to turn blue. Exposure causes a breakdown of red blood cells, which can lead to kidney damage. May affect bone marrow (aplastic anemia).

Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May cause burns to skin tissue upon contact.

Eye Contact:
Causes irritation, redness, and pain. May cause burns.

Chronic Exposure:
Chronic exposure may affect red blood cells which can have an effect on the liver, kidney and other organs.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Contact with oxidizable substances may cause extremely violent combustion. Liberates toxic gases when involved in a fire.
Explosion:
Strong oxidants may explode when shocked, or if exposed to heat, flame, or friction. Also may act as initiation source for dust or vapor explosions. Containers may explode when involved in a fire. Sensitive to mechanical impact.
Fire Extinguishing Media:
Flood with large amounts of water.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage and moisture. Isolate from any source of heat or ignition. Avoid storage on wood floors. Separate from incompatibles, combustibles, organic or other readily oxidizable materials. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
15 mg/m3 total dust, 5 mg/m3 respirable fraction for nuisance dusts.
- ACGIH Threshold Limit Value (TLV):
10 mg/m3 total dust containing no asbestos and < 1% crystalline silica for Particulates Not Otherwise Classified (PNOC).

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
White powder.
Odor:
Odorless.
Solubility:
1.5 g in 100 g of water.
Density:
2.52
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
400C (752F)
Melting Point:
610C (1130F)
Vapor Density (Air=1):
4.8
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Chlorine and oxides of potassium.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Aluminum, magnesium, charcoal, fluorine, sulfur, many combustible substances and reducing agents.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

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11. Toxicological Information

Investigated as a reproductive effector.
--------\Cancer Lists\----------
---NTP Carcinogen---

Ingredient	Known	Anticipated	IARC Category
Potassium Perchlorate (7778-74-7)	No	No	None

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12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: POTASSIUM PERCHLORATE
Hazard Class: 5.1
UN/NA: UN1489
Packing Group: II
Information reported for product/size: 275LB

International (Water, I.M.O.)

Proper Shipping Name: POTASSIUM PERCHLORATE
Hazard Class: 5.1
UN/NA: UN1489
Packing Group: II
Information reported for product/size: 275LB

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15. Regulatory Information

```
  --------\Chemical Inventory Status - Part 1\------------------------
--------
  Ingredient                                        TSCA  EC   Japan
Australia
  ------------------------------------------------  ----  ---  -----  --
-------
  Potassium Perchlorate (7778-74-7)                  Yes  Yes   Yes
Yes

  --------\Chemical Inventory Status - Part 2\------------------------
--------
                                                                --Canada--
  Ingredient                                        Korea  DSL   NDSL
Phil.
  ------------------------------------------------  -----  ---   ----  -
----
  Potassium Perchlorate (7778-74-7)                  Yes   Yes   No
Yes

  --------\Federal, State & International Regulations - Part 1\--------
--------
                                                -SARA 302-    ------SARA
313------
  Ingredient                                    RQ    TPQ     List
Chemical Catg.
  ----------------------------------------  ---   -----   ----  ------
--------
  Potassium Perchlorate (7778-74-7)         No    No      No
No

  --------\Federal, State & International Regulations - Part 2\--------
--------
                                                              -RCRA-    -
TSCA-
  Ingredient                                CERCLA     261.33     8(d)
  ----------------------------------------  ------     ------    -----
-
  Potassium Perchlorate (7778-74-7)         No         No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: Yes         (Pure / Solid)
```

Australian Hazchem Code: 2W
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **2** Other: **Oxidizer**

Label Hazard Warning:

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES SEVERE IRRITATION TO EYES, SKIN AND RESPIRATORY TRACT. AFFECTS KIDNEYS AND BLOOD.

Label Precautions:

Keep from contact with clothing and other combustible materials.
Store in a tightly closed container.
Do not store near combustible materials.
Remove and wash contaminated clothing promptly.
Avoid contact with eyes, skin and clothing.
Avoid breathing dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

CONTAMINANT FACT SHEET - TRICHLOROETHENE

CAS Number:79-01-6	**Molecular Weight: 131.4**	**Color: Colorless**	**Ionization Potential (eV): 9.45**	**Vapor Density (Air=1):4.54**
Synonyms: Trichloroethylene; TCE	**Physical State: Liquid**	**Odor: Chloroform-like**	**Henry's Constant: 0.50**	**Vapor Pressure: 58 (mmHg@20C)**

Fire Hazard	**Reactivity Hazard**	**Health Hazard**	
NFPA rating: 2 **HMIS rating: 2**	**NFPA rating: 0** **HMIS rating: 0**		**NFPA rating: 2** **HMIS rating: 2**
Flash Point(°F): 90 LEL(%): 8 UEL(%): 10.5 Fire Extinguishing Media: ☒ Dry Chemical ☒ Foam ☐ Water Spray ☒ CO_2 Fire Extinguisher: ☐ Class A ☐ Class B ☐ Class C ☐ Class D ☒ Class A/B/C DOT: ☐ Flammable Liquid ☐ Combustible Liquid	Incompatibilities: Strong caustics; alkalis; chemically active metals (such as barium, lithium, sodium, magnesium, titanium and beryllium DOT: ☐ Oxidizer ☐ Water Reactive	Odor Threshold (ppm): 82 IDLH (ppm): 1000 *5-Min peak in any two hours. Signs/Symptoms of Acute Exposure: Irritation of eyes and skin; headache; vertigo; visual disturbance; fatigue; giddiness; tremor; sleepiness; nausea; vomiting; dermatitis DOT: ☐ Poison	Carcinogenic: OSHA: ☐ Yes ☒ Not listed IARC: ☐ Group 1 ☒ Group 2A ☐ Group 2B ☐ Group 3 ☐ Group 4 ☐ Not listed NTP: ☐ Known ☒ Anticipated ☐ Process ☐ Not listed ACGIH: ☐ A1 ☐ A2 ☐ A3 ☐ A4 ☒ A5 ☐ Not listed Skin Absorbable: ☐ Yes ☒ No Skin Corrosive: ☐ Yes ☒ No DOT: ☐ Corrosive

Source	**TWA (ppm)**	**STEL (ppm)**	**C (ppm)**
OSHA PELs	100	NA	200, 300*
ACGIH TLVs	50	100	NA

Air Monitoring

Type	**Brand/Model No.**	**Calibration Method/Media**
☐ Explosimeter	Gastech GX-82	Methane
☒ PID	MiniRAE	Isobutylene
☒ FID	Foxboro OVA	Methane
☒ Colorometric Tubes	Drager/CH24401 (10-500pmm)	Check pump for leaks
☐ Chemical Monitor ☐ Dust Monitor		
☒ Collection Medium/Sampling Pump	Gilian Pump/NIOSH#1022	Calibrate pump w/ media

Protective Clothing

Glove Type/Brand (Breakthrough >2 hrs unless noted):	☒ Viton/North	☐ Viton/Best	☒ Silvershield/North	☒ 4H/Safety
	☐ Neoprene/Mapa	☐ Neoprene/Ans.Ed.	☐ Neoprene/BestUltraflex	☐ Neoprene/BestNeo.(30min)
	☐ PVC/Ans.Ed.	☐ PVC/BestHustler	☐ Nitrile/LabSafe.	☐ Nitrile/Ans.Ed.
	☐ Butyl/North	☐ PVA/Ans.Ed.	☐ Other	

Suit Type (Breakthrough >1hr unless noted): ☐ Tyvek ☐ Tyvek QC ☐ Tyvek/Saranex ☐ Tychem7500 ☒ Tychem 9400 ☐ Other

Respiratory Protection

☐ Air Purifying ☒ Air Supplied Only | Maximum Use Concentration (ppm): Half mask: NA Full face: NA

Notes:

Prepared by: Sherry Hall Date: 16 January 1997, Rev. 30 January 2002

Attachment B-3
Hazard Mitigators Directory

Included in HASP	*Hazards*	*Mitigators Document Number*
I. Chemical Hazards		
☒	Fire	Fire – Hazmit.doc
☒	Inhalation	Inhalation (dust)-Hazmit.doc
☐	Reactivity	Reactivity – Hazmit.doc
☒	Skin Absorption	Skin Absorption – Hazmit.doc
II. Physical Hazards		
☒	Backhoe	Backhoe – Hazmit.doc
☐	Boating	Boating – Hazmit.doc
☐	Cold Stress	Cold Stress – Hazmit.doc
☐	Compressed Gas Cylinder	Compressed Gas Cylinder – Hazmit.doc
☒	Drilling	Drilling – Hazmit.doc
☒	Drum Handling	Drum Handling – Hazmit.doc
☒	Electrocution	Electrocution – Hazmit.doc
☐	Excavation/Trenching	Excavation Trenching – Hazmit.doc
☒	Eye Injury	Eye Injury – Hazmit.doc
☒	Hand/Foot Injury	Hand-Foot Injury – Hazmit.doc
☒	Heat Stress	Heat Stress – Hazmit.doc
☒	Heavy Equipment	Heavy Equipment – Hazmit.doc
☒	Lifting Heavy Loads	Lifting Heavy Loads – Hazmit.doc
☒	Noise	Noise – Hazmit.doc
☒	Portable Power/Hand Tools	Portable Power Hand Tool – Hazmit.doc
☐	Radiation Exposure	Radiation Exposure – Hazmit.doc
☒	Slips, Trips and Falls	Slips Trips and Falls – Hazmit.doc
☒	Public and Private Thoroughfares	Thoroughfares – Hazmit.doc
☐	Other	
III. Biological Hazards		
☒	Allergic Reaction to Poisonous Plants	Allergies-PoisonousPlants – Hazmit.doc
☒	Dogs	Dogs – Hazmit.doc
☒	Insect/Vermin/Snake Bites	Insect – Vermin - Snake Bites – Hazmit.doc
☐	KB-1 Injection Into Groundwater	KB-1 Injection Into Groundwater – Hazmit.doc
☐	Medical Waste	Medical Waste – Hazmit .doc
☐	Other	

HAZARD MITIGATORS - *FIRE*

Applies to Task: ☒ ① ☒ ② ☒ ③ ☒ ④ ☒ ⑤ ☒ ⑥ ☒ ⑦ ☒ ⑧

- Know fire prevention procedures, fire-fighting techniques and essential precautions to prevent injury.
- Know how to use a fire extinguisher.
- Keep all fire extinguishers in a ready condition and accessible at all times. Access to or visibility of extinguishers shall not be obstructed.
- Do not place charged fire extinguishers on the open ground or on floors.
- Remove only the minimum required supply of paints, solvents, or other flammables from storage. At no time shall the quantity removed exceed one day's working supply.
- Do not allow combustible products of rubbish, waste or other residues to accumulate. Oil soaked rags and material subject to spontaneous combustion shall only be stored in non-combustible containers with self-closing lids.
- Do not store gasoline, flammable solvents, and liquids inside a building unless the structure has been approved for flammable storage containers. Only OSHA-approved storage cabinets shall be used for all flammable liquids, paints or solvents.
- Flammable liquids shall be stored in locations that will not interfere with evacuation of the area in case of a fire.
- Do not permit smoking, striking of matches, or other sources of ignition outside of designated "SMOKING" areas.
- Discard cigarette butts, matches or other similar materials in non-combustible containers.
- Do no stop to get anything out of a building or area if evacuation is required. JUST GET OUT - and assemble in the predetermined evacuation assembly points.

HAZARD MITIGATORS – *INHALATION* (Dust)

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☐ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Be aware that the lungs are extremely vulnerable to chemical agents. Even substances that do not directly affect the lungs may pass through lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body.
- Know the odor and odor threshold of the chemicals of concern. Some toxic chemicals present in the atmosphere may not be detected by human senses (i.e., they may be odorless and colorless, and their toxic effects may not produce any immediate symptoms).
- Use engineering controls to reduce vapor concentrations (e.g., ventilation) or dusty atmospheres (e.g., dust suppression techniques).
- Wear respiratory protection as indicated by air monitoring results and/or as required by the Health and Safety Plan.

HAZARD MITIGATORS - *SKIN ABSORPTION*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Be aware of chemicals of concern that can directly injure the skin or that can be absorbed into the bloodstream and subsequently transported to other organs.
- Know that skin absorption is enhanced by abrasions, cuts, heat, and moisture.
- Do not wear contact lenses in contaminated atmospheres (since they may trap chemicals against the eye surface). The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface and be carried to the rest of the body through the bloodstream (capillaries are very close to the surface of the eye).
- Keep hands away from face.
- Minimize contact with liquid and solid chemicals.
- Wear protective clothing (e.g., suits and gloves) as required by the Health and Safety Plan.

HAZARD MITIGATORS - BACKHOE

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☐ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- If you are supervising Backhoe operations, develop a system of hand signals to direct the backhoe operator.
- Be familiar with the operations/activities of the backhoe.
- Ensure ground is stable and backhoe is level; be aware of hazards associated with having the backhoe operate on slopes (roll and slide risk).
- Wear hard hat, safety glasses, steel toe boots and hi-visibility vest while working around backhoe.
- Ensure proper clearance is maintained from overhead power lines.
- If excavation is greater than 4 feet in depth, following trenching and shoring mitigator. Also, be aware that this is considered a confined space. Don't enter the excavation unless all confined space procedures are followed.
- Make eye contact with backhoe operator before approaching equipment or excavation. Don't approach from the operator's blind spot.
- When observing work performed by a backhoe, you should stay out of the immediate turning radius of the bucket and to stand at a location where you can be clearly seen by the equipment operator at all times. Be aware of the tail swing on tracked excavators.
- Listen for noises such as backup signal and potential equipment failure (e.g., hissing fom a hydraulic line, metal on metal crash).
- Don't work or walk under suspended loads or boom arm of any excavator.
- Never work in pinch points.
- Only use excavator for the purpose it was intended (i.e., do not use to lower a person, or to dig a person out if an excavation caves in).
- Wait for the backhoe bucket to be secure on the ground before entering the operators work zone.

Don't sample from the bucket, let operator carefully place soils on the ground (plastic, etc.) and take sample from center (untouched) portion of soils.

HAZARD MITIGATORS - BACKHOE

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☐ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- However, for an undisturbed semi-volatile or highly volatile samples, rest the bucket on the ground and have the operator shut off the equipment, then grab the sample from the center of the bucket
- Do not ride on backhoes
- Never be involved in the equipment maintenance. Stay away from equipment while maintenance is being performed.
- Plan and emergency egress in case of an accident.
- If the operator is servicing equipment, be aware that the operator:
  - Depressurizes the hydraulic system before working on the hydraulics.
  - Blocks the excavator arm so that it cannot move prior to working on it.
  - Rests the excavator arm and bucket firmly on the ground and blocks tires or sets outriggers prior to working on equipment.

HAZARD MITIGATORS - *DRILLING*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☐ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- All members of the drilling crews shall be trained in the safety features and procedures to be utilized during operation, inspection, and maintenance of the equipment.
- Conduct a survey, prior to bringing drilling equipment to the job site, to identify overhead electrical hazards, potential subsurface hazards, and terrain hazard. Once on site, before drilling equipment is moved, the travel route shall again be visually surveyed for overhead and terrain hazards.
- Use only drilling equipment equipped with two easily-accessible emergency shutdown devices, one for the operator and one for the helper.
- Do not transport drilling equipment with the mast in the upward position.
- Set up equipment on stable ground. Cribbing (a system of timbers, arranged in a rectangular pattern, used to support and distribute the weight of the equipment) shall be used when necessary.
- Extend outriggers per the manufacturer's specifications.
- Monitor weather conditions. Operations shall cease during electrical storms or when electrical storms are imminent.
- Wearing of loose clothing or equipment is not permitted.
- Use auger guides on hard surfaces.
- Verbally alert employees and visually ensure employees are clear from dangerous parts of equipment prior to starting or engaging equipment.
- Channel the discharge of drilling fluids away from the work area to prevent the ponding of water.
- Use hoists only for their designed intent. Hoists shall not be loaded beyond their rated capacity. Steps shall be taken to prevent two-blocking of hoists (the condition when the lower load block or hook assembly comes in contact with the upper load block, or when the load block comes in contact with the boom tip).
- Follow the equipment manufacturer's procedures if ropes become caught in, or objects are pulled into a cathead.

HAZARD MITIGATORS - *DRILLING*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☐ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Do not run or rotate drill rods through rod slipping devices. No more than 1 foot of drill rod column shall be hoisted above the top of the drill mast. Drill rod tool joints shall not be made up, tightened, or loosened while the rod column is supported by a rod slipping device.
- Control dust using dust suppression techniques.
- Clean augers only when the rotating mechanism is in neutral and the auger is stopped. Tools such as long-handled shovels shall be used to remove cuttings from the auger.
- Cap and flag open boreholes; open excavations shall be barricaded.
- Keep all hand tool used during drilling operations clean and in good working condition.
- Wear hard hats and steeltoed boots at all times when performing drilling operations.
- Wear hearing protection when required.

HAZARD MITIGATORS – *DRUM HANDLING*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Use only drums and containers that meet the appropriate DOT, OSHA, and EPA regulations.
- Be aware of the potential hazards of the contents of drums or containers before handling. Only trained personnel should open drums containing unknown materials.
- Know that bulging drums or containers are an indication of pressure build-up. Open all drums or bungs extremely slowly to determine the presence of vapors or pressure inside the drum. If the possibility of fire or explosion exists, a protective shield should be used and/or remote opening devices. Employees not directly involved with opening a container shall be kept a safe distance away.
- Consider any unlabeled drum or container as containing a hazardous substance and leave it alone until contents are properly identified and labeled. Do not assume that exterior labeling properly identifies the contents or potential hazards of drums and containers.
- Employees must be warned of the potential hazards associated with the contents of containers or drums prior to moving said containers or drums.
- Label and identify drums and containers when moved to the staging areas to safely identify and classify their contents. Segregate incompatible drums.
- Staging areas shall be provided with adequate egress routes. Use secondary containment at staging area for all moved drums.
- Inspect the integrity of the drum container before moving. Any drum or container lacking integrity shall be overpacked.
- Organize site operation to minimize the amount of drum or container movement. Have a clear view of the available pathway when moving drums. If needed, an additional person should be available to provide guidance.
- Utilize drum/container handling equipment whenever possible. The equipment should have a sufficiently rated load capacity, and should be able to operate smoothly on the available surface.
- Use proper lifting and moving techniques to prevent back injuries, if handling equipment is not available.
- Never stand on drums or containers.

HAZARD MITIGATORS – *DRUM HANDLING*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Use non-sparking tools
- Fire extinguishing equipment must be onsite at all times during drum handling.
- Spill control equipment shall be onsite in areas where spills ruptures or leaks may occur.
- Cease all site operations immediately if site activities uncover buried drums or containers. The SHSO music be notified. The SHSO will evacuate the area. All unknown situations must be evaluated before site activities are resumed. The services of a specialized contractor trained in handling unknown contaminants may be needed. If, after evaluating the situation, only a portion of the site is affected, that area shall be barricaded and work may continue at other portions of the site.

HAZARD MITIGATORS - *ELECTROCUTION*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☐ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- A minimum clearance of 20 feet (radius) will be maintained between heavy equipment (i.e., drill rig) and any overhead power lines, regardless of voltage.
- Before subsurface work, a utilities search for underground lines will occur and will be documented.
- Installation and maintenance of electrical facilities or equipment must only be performed by qualified and properly authorized personnel or electrical subcontractors. Apprentice personnel permitted to work on electrical equipment shall be under the surveillance of a fully qualified electrician.
- Electricians shall be familiar with the National Electrical Code; state and local electric codes; OSHA standards, including 29 CFR 1926, Subpart K; and applicable sections of the National Fire Protection Association Codes.
- When working on energized circuits of 440 volts or higher, at least one qualified electrician and one other employee shall be present.
- Do not wear rings, watches or metallic objects that could act as conductors when working with electrical circuits.
- Do not use metal ladders and uninsulated tools while working with electrical circuits and equipment.
- Follow the company Lock-out/Tag-out procedures when applicable. Electrical equipment and lines shall always be considered "energized" until proven "de-energized". Before beginning work, each electrical circuit shall be inspected, tested, and where possible, isolated from the power source. Extreme care shall be exercised as wires designed to operate at ground potential may become energized by faulty or inadequate connections.
- Use only approved grounding equipment as a ground for electrical equipment. Metal frames on electricity-powered equipment, electrical facilities, and transmission equipment shall be connected to the grounding system. Alternative grounding systems complying with applicable electrical codes may be used for temporary portable equipment.
- Protect electrical wires with suitable protective conduits or devices where they are exposed to possible damage.
- Connect grounding devices to a ground before contacting any conductor of a circuit. When grounding devices are removed, they shall be disconnected from the circuit before

being disconnected from ground.

- Equip all portable extension cords with a non-conducting plug and/or another socket shell. All electrical cords shall be equipped with three-blade grounding type plugs.
- Use only heavy duty electrical cords that are not subjected to excessive bending, stretching, or kicking. All cords and wires shall be frequently inspected for signs of defects. Damaged or frayed electrical wires, cords, and plugs shall be immediately replaced by a qualified electrician or other properly trained personnel.
- Install adequate warning signs and barriers (in plain sight) in all areas where hazardous electrical facilities exist.
- Do not permit overloading of electrical circuits at anytime. The replacement of fuses or circuit breakers with makeshift materials or over-capacity fuses is strictly prohibited.
- The type of circuit shall determine the type of protective equipment required. Rubber gloves, sleeves, blankets, mats, and insulated platforms shall be used as required. Questions regarding PPE should be directed to the SHSO.
- Inspect all insulated protective equipment continuously for defects or damages. Any defective equipment shall be replaced before using.
- Establish and enforce testing schedules for insulation qualities for protective equipment. All users shall verify that equipment has been satisfactorily tested prior to use.

HAZARD MITIGATORS - *EYE INJURY*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Wear appropriate eye protection according to the task at hand (e.g., goggles if liquid splash could occur, welding lenses, etc.).
- Minimize the amount of vapor or particulate matter generated, if possible.
- Avoid touching the face and eyes.
- Flush eye with water for at least 15 minutes if chemicals do get into the eye.

HAZARD MITIGATORS - *HAND/FOOT INJURY*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Be aware of "pinch points" when working with tools and heavy equipment.
- Use proper lifting techniques to avoid dropping heavy loads on hands and feet.
- Be aware of moving machinery and heavy equipment in the work area.
- Wear protective gloves as required in the Health and Safety Plan.
- Wear steeltoed boots as required in the Health and Safety Plan.

HAZARD MITIGATORS – *HEAT STRESS*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Be able to recognize and treat heat stress, and to identify the signs and symptoms of heat stress (e.g., muscle spasms, dizziness, lack of perspiration).
- Maintain an optimal level of physical fitness. Fit individuals may acclimatize more readily to temperatures.
- Adjust work and rest schedules as needed. Establish a work regimen that will provide adequate rest periods for cooling down. This may require additional shifts of workers.
- Provide shelter or shaded areas (77° F is best) to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels to ensure that the cardiovascular system functions adequately. Daily fluid intake must equal the approximate amount of water lost in sweat. Workers are encouraged to drink more than the amount required to satisfy thirst, because thirst is not an adequate indicator of adequate salt and fluid replacement.
- Remove impermeable protective garments during rest periods.
- Do not assign other tasks to personnel during rest periods.
- Provide cooling devices, when necessary, to aid natural body heat exchange during prolonged work or severe heat exposure. Effect devices include field showers or hose-down areas; as well as cooling jackets, vests, or suits.

HAZARD MITIGATORS – *HEAVY EQUIPMENT*
Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☐ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧ ☐ ⑨ ☐ ⑩

- Apply Hazard Mitigators for motor vehicles when utilizing heavy equipment (where applicable).
- Remember, heavy equipment has the right-of-way over regular vehicles and pedestrians. Yield to heavy equipment.
- Listen for warning signals on heavy equipment.
- Perform a visual inspection and walk around parked heavy equipment before moving to assure that equipment is in good condition and that there are no personnel on the ground that could be injured or objects that could be damaged by vehicle movement.
- Use hand rails and footholds when mounting and dismounting equipment,
- Follow appropriate equipment startup procedures. Brakes, steering, clutches and controls shall be tested.
- Pay attention to workers on the ground who may be in the path and provide warning prior to moving the equipment.
- Permit no one to ride on, or in, heavy equipment. This includes any portion of a backhoe, bulldozer, forklift or the back of a pickup truck, except in locations specifically designed for passenger use and approved by the SHSO.
- Locate and flag underground utilities and buried cables, whenever possible, prior to intrusive activities (such as excavation and drilling).
- Keep haulage vehicles under positive control at all times while operating. Vehicles shall be kept in gear when descending grades.
- Do not use heavy equipment on slopes with steepness exceeding 3H:1V unless operations are consistent with manufacturer's recommendations (if the Owner's Manual is not with the equipment or does not specify slope operating procedures, see the SHSO).
- Operate equipment with booms, blades, buckets, beds, etc., lowered or in a stable position while on slopes. Safety cables tethered to appropriate anchors shall be used for equipment working on steep slopes, where appropriate. The use of cables and anchors must be approved by the SHSO.

HAZARD MITIGATORS – *HEAVY EQUIPMENT*
Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☐ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧ ☐ ⑨ ☐ ⑩

- Use rollover protection and seat belts.
- Lower hydraulic systems (e.g., blades, rippers, etc.) to the ground, set brakes, and shut down equipment if malfunction occurs which impairs the ability to control a piece of equipment.
- Suspend in slings or support by hoists or jacks heavy equipment in need of repair. The equipment must also be blocked or cribbed before workers are permitted to work underneath. Working under heavy equipment can pose a crushing hazard.
- Shut off motors, do not allow smoking, and use proper dispensing equipment when refueling gasoline-operated equipment to prevent fire hazards.
- Wear hearing protection if required.
- Maintain eye contact with the heavy equipment operator when working near equipment.
- Be aware of changes in sound of equipment which may indicate a change in direction or activity.

HAZARD MITIGATORS – *LIFTING HEAVY LOADS*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Know and practice proper lifting techniques.
- Limit continuous lifting of weights to 50 pounds or less. Lifts of heavier weights are permitted on an interim basis. Help shall be obtained for lifting of loads greater than 50 pounds. Mechanical equipment should be used on heavy materials when possible. If mechanical assistance is not available, adequate manpower to maintain the 50-pound limit per employee will be required.
- Do not lift more weight than can be handled comfortably, regardless of load weight. If necessary, help should be requested to lift a load so that the lifting is comfortable.
- Use drum dollies when moving drums or barrels.
- Inspect objects for grease or slippery substances before they are lifted to ensure that the object will not slip.
- Do not carry long, bulky or heavy objects without first verifying that the way is clear and that vision is unobstructed. This ensures that other persons or objects will not be struck by the load.
- Do not carry loads that cannot be seen over or around.
- Make sure workers are physically suited for the job before assigning jobs requiring heavy and/or frequent lifting. A person's lifting ability is not necessarily indicated by his height or weight.
- Before lifting an object, consideration should be given to how the object will be set down without pinching or crushing hands or fingers. For example, to place an object on a bench or table, the object should be set on the edge and pushed far enough onto the support so it will not fall. The object can then be released gradually as it is set down, and pushed in place with the hands and body from in front of the object.
- When two or more persons are handling the same object, one should "call the signals". All the persons on the lift should know who this person is and should warn him if anyone in the crew is about to relax his grip.
- Proper lifting includes:
  - *Feet* - Feet should be parted, with one foot alongside the object being lifted and one behind. Feet should be comfortably spread to give greater stability. The rear foot should be in position for the upward thrust of the lift.

HAZARD MITIGATORS – *LIFTING HEAVY LOADS*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- *Back* - Use the sit-down position and keep the back straight, but remember that "straight" does not mean "vertical". A straight back keeps the spine, back muscles, and organs of the body in correct alignment. It minimizes the compression of the abdomen that can cause a hernia.
- *Arms and Elbows* - The load should be drawn close, and the arms and elbows should be tucked into the side of the body. When the arms are held away from the body, they lose much of their strength and power. Keeping the arms tucked in also helps keep body weight centered.
- *Palm* - The palm grip is one of the most important elements of lifting. The fingers and the hand are extended around the object to be lifted. Use the full palm; fingers alone have very little power.
- *Chin* - Tuck in the chin so the neck and head continue the straight back line. Keep the spine straight and firm.
- *Body Weight* - Position the body so its weight is centered over the feet. This provides a more powerful line of thrust and assures better balance. Start the lift with a thrust of the rear foot. Shift hand position so the object can be boosted after knees are bent. Straighten knees as object is lifted or shifted to the shoulders. To change direction, lift the object to a carrying position, and turn the entire body, including the feet. Do not twist your body. In repetitive work, both the person and the material should be positioned so that the worker will not have to twist his body when moving the material. If the object is too heavy to be handled by one person, get help.

HAZARD MITIGATORS - *NOISE*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☐ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Know the effects of noise, including:
  - Workers being startled, annoyed, or distracted.
  - Physical damage to the ear, pain, and temporary and/or permanent hearing loss.
  - Communication interference that may increase potential hazards due to the inability to warn of danger and proper safety precautions to be taken.
- Utilize feasible administrative or engineering controls if workers are subjected to noise exceeding an 8-hour, time-weighted average (TWA) sound level of 90 dBA (decibels on the A-weighted scale).
- Implement the company Hearing Conservation Program when noise exposures equal or exceed an 8-hour, TWA sound level of 85 dBA.
- Wear hearing protection where applicable.

HAZARD MITIGATORS - *PORTABLE POWER/HAND TOOLS*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Route cords, hoses, and cables supplying power to portable power tools to prevent tripping hazards or contact with equipment or machinery.
- Avoid abusing the power supply lines of portable equipment. Excessive scraping, kicking, stretching, and exposure to grease and oils will damage lines or cause them to fail prematurely, and possibly injure the operator or fellow workers.
- Inspect cords, hoses, and cables for wear or deterioration. Defective power supply lines shall not be used.
- Do not use electrically powered tools near flammable materials or explosive atmosphere, unless they are of the explosion-proof type meeting the National Electrical Code for explosive area. Employees operating the equipment should be aware of sparks and or metal fragments when using this equipment.
- Ground-check portable electric power tools with metal cases initially and quarterly. At no time will electrical power equipment be operated without proper grounding. All electrical cords and cables, including extension cords, shall include a third wire ground.
- Prohibit operations of electric tools in wet or damp areas except in unusual emergency circumstances. When operation is required in wet or damp conditions, extreme care will be exercised to ensure effective grounding of equipment and proper use of protective gear.
- Size cords adequately for length and the electrical demand of the tool. Otherwise, they may cause a fire hazard.
- Limit use of tools to the purpose for which the tool is intended (e.g., wrenches will not be used as hammers). Defective tools (e.g., with mushroomed heads or split or defective handles) shall not be used.
- Protect tools from corrosion damage.
- Keep tools free of accumulated dirt and unnecessary oil or grease. Moving and adjustable parts shall be lubricated frequently to prevent wear and misalignment.

HAZARD MITIGATORS - *PORTABLE POWER/HAND TOOLS*
Applies to Task: ☐ ① ☐ ② ☒ ③ ☒④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- Replace or repair damaged or worn tools promptly. Temporary or makeshift repairs are prohibited. At the discretion of the supervisor, discard all tools that cannot be repaired safely. Supervisors shall decide when to discard a tool.
- Store tools in suitable boxes or containers. Loose tools shall not be stored on ledges or where they might fall. Tools shall be picked up when a job is completed and not be allowed to accumulate in the work area. Store all tools in a safe place.
- Do not use conducting (i.e., metal) tools around electrical facilities. Insulated tools, approved for electrical work, shall be tested frequently for proper insulation.
- Select the correct size and type of wrench for each job. Wrench handles shall not be extended with a pipe or cheater because the jaws will spread.
- Repair mushroomed punch, drift and chisel heads. Mushroomed heads represent crystallized metal that will break and fly off when struck.
- Wear eye protection at all times.

HAZARD MITIGATORS – *SLIPS, TRIPS AND FALLS*

Applies to Task: ☒ ① ☒ ② ☒ ③ ☒ ④ ☒ ⑤ ☒ ⑥ ☐ ⑦ ☐ ⑧

- Wear the proper foot wear for the task at hand.
- Pay attention to the environment and use caution when moving about onsite.
- Use caution when walking on sloped areas (especially geosynthetics), particularly when moisture is present. Uses caution when walking on soft or uneven surfaces; e.g., marsh areas. Watch for ice conditions in cold weather.
- Follow the easiest and safest path to the destination.
- Follow good housekeeping procedures. Never assume that someone else will clean up a spill or put away an object.
- Remove objects that pose tripping hazards where practicable.
- Prevent water accumulation where practicable.
- Cables and/or writing should be taped down, when possible.
- Mark or repair any opening or hole in the floor.
- Carry objects in a manner that allows you to see in the area you are moving in. Do no carry objects that are too large or bulky. Do not carry more weight than you can balance and keep stable. Understand that PPE can reduce or limit your field of vision and mobility.
- Use the proper ladder for the task at hand and do not exceed the recommended height. Do not use the top two rungs of a ladder. Utilize the buddy system to help secure the ladder. When working over 6 ft., utilize fall prevention measures. Obey height and weight guidelines and/or rules.
- Use the handrail when using stairs. Be aware of stairway blockages.
- If conditions even slightly resemble an unsafe environment, do not make any assumptions that the integrity of a workplace is intact.
- Never jump over or into a trench excavation.
- Close filing cabinets and drawers.
- Avoid becoming fatigued.
- Slow down do not run.

HAZARD MITIGATORS – *PUBLIC AND PRIVATE THOROUGHFARES*

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

- All care should be taken to ensure the integrity of walking and working surfaces, including the use of barriers, toekicks, etc. to warn personnel and the public of the potential fall and tripping hazards and to prevent the same. As needed, guardrails or barrier walls may be constructed surrounding open pits and trenches.
- When operations such as signs, signals and barricades do not provide the necessary protection on or adjacent to a highway or street (including a sidewalk), flagmen or other appropriate traffic controls shall be provided.
- Signaling directions by flagmen shall conform to American National Standards Institute D6.1-1971, *Manual on Uniform Traffic Control Devices for Streets and Highways.*
- Hand signaling by flagmen shall be by use of red flags at least 18 inches square or sign paddles, and in periods of darkness, red lights.
- Flagmen shall be provided with and shall wear a red or orange warning garment while flagging. Warning garments worn at night shall be of reflectorized material..
- Cranes and hoists when elevated must be signaled in accordance with applicable American National Standards Institute standards.
- Barricades for protection of employees shall conform to the portions of the American National Standards Institute D6.1 – 1971 Manual on Uniform Traffic Control Devices for Street and Highways, relating to barricades.

HAZARD MITIGATORS – *ALLERGIC REACTION TO POISONOUS PLANTS*

Applies to Task: ☒ ① ☒ ② ☒ ③ ☒ ④ ☒ ⑤ ☒ ⑥ ☐ ⑦ ☐ ⑧

- Be able to recognize and identify poisonous plants indigenous to the site location.
- Removed or destroy poisonous plants where practicable.
- Wear appropriate protective clothing (e.g., gloves, long-sleeved shirts) as required.
- Provide soap and water for washing exposed parts.
- Make first aid remedies available for treatment of affected skin areas.

HAZARD MITIGATORS – *DOGS*

Applies to Task: ☒ ① ☒ ② ☒ ③ ☒ ④ ☒ ⑤ ☒ ⑥ ☐ ⑦ ☐ ⑧

- Never approach a stray dog.
- If a strange dog is at your site, stay in the vehicle if possible.
- When a dog begins growling and snarling and does threaten you, stay calm. Do not scream, and if you must say anything at all, use a calm, firm voice and avoid eye contact. Back slowly away from the dog, or stand still until it turns away, but do not run.
- If approached, keep your hands firmly by your side. Do not wave them around.
- Avoid eye contact with the dog.
- Do not disturb a dog that is eating, sleeping, tied up, or has puppies.
- Be aware of the dog's behavior. Many stray dogs may have rabies.
- If you see two dogs fighting, never get involved.
- If a dog attacks, curl into a ball with your hands over your head and neck, and protect your face.
- If you do pet a dog, avoid the area on top of the head and the back of the neck, because a dog might perceive this as a threat. Instead go for the underside of the dog's neck.
- Never approach from behind a dog to pet it. The dog may be startled.
- Stay away from an injured animal.
- Don't tease a dog, or take a toy or bone away from him.
- Never lunge at a dog.
- Make a first aid kit available for treatment if bitten.

HAZARD MITIGATORS – *INSECT/VERMIN/SNAKE BITES*

Applies to Task: ☒ ① ☒ ② ☒ ③ ☒ ④ ☒ ⑤ ☒ ⑥ ☐ ⑦ ☐ ⑧

- Be able to recognize insects/vermin/snakes indigenous to the site location.
- Advise the SHSO if you have allergies to any insects prior to engaging in any field activities.
- Include the following controls:
  - Boots, hoods, netting, gloves, masks, or other personal protection.
  - Repellents.
  - Drainage or spraying of breeding areas.
  - Burning or destruction of nests.
  - Smudge pots and aerosols for protecting small areas.
  - Elimination of unsanitary conditions which propagate insects or vermin.
  - Extermination measures.
  - Inoculation.
- Report any bites or stings to the SHSO and seek first aid immediately.

Attachment B-4
Air Monitoring Equipment / Frequency of Reading / Action Guidelines Per Task

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

☐ *Explosimeter*

Brand/Model No.: _____

Monitoring Frequency: _____

Source Reading (% LEL)	Action
1 to 10	Continue with caution.
Greater than 10	Stop work. Evacuate the area. If upon return, concentration still exceeds 10% LEL, Level B PPE must be acquired and worn by trained personnel.

Note: _____

☐ *Oxygen Meter*

Brand/Model No.: _____

Monitoring Frequency: _____

Source Reading (%)	Action
Less than 19.5	Stop work. Evacuate the area. If upon return, concentration is still <19.5, Level B PPE must be acquired and worn by trained personnel.
19.5 to 23.5	Continue to work with caution.
Greater than 23.5	Stop work. Evacuate the area.

Note: _____

☒ *Photoionization Detector*

Brand/Model No.: MiniRAE 2000 or equivalent

Monitoring Frequency: Approximately every 15 minutes

Breathing Zone Reading	Action
0 ppm to 10 ppm	Level D PPE
Greater than 10 ppm	Stop work. Evacuate the area. If upon return, levels still exceed 10 ppm, Level C PPE must be acquired and worn by trained personnel.

Note: _____

☐ *Flame Ionization Detector*

Brand/Model No.: _____

Monitoring Frequency: _____

Breathing Zone Reading (ppm)	Action
_____ to _____	Level D PPE
_____ to _____	Level C PPE
Greater than _____ _____	Stop work. Evacuate the area. If upon return, levels still exceed ____, Level B PPE must be acquired and worn by trained personnel.

Note: _____

☐ *Chemical Detector Tube*

Brand/Model No.: _____

Monitoring Frequency: _____

Breathing Zone Reading (ppm)	Action
_____ to _____	Level D PPE
_____ to _____	Level C PPE
Greater than _____ _____	Stop work. Evacuate the area. If upon return, levels still exceed ____, Level B PPE must be acquired and worn by trained personnel.

Note: _____

☐ *Other*

Brand/Model No.: _____

Monitoring Frequency: _____

Breathing Zone Reading ☐ ppm ☐ mg/m^3 ☐ Other:	Action
_____ to _____	Level D PPE
_____ to _____	Level C PPE
Greater than _____ _____	Stop work. Evacuate the area. If upon return, levels still exceed ____, Level B PPE must be acquired and worn by trained personnel.

Note: _____

Attachment B-5
Personal Protective Equipment Per Task

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

☒ *Modified Level D**		☐ *Level C**		☐ *Level B**	
Equipment	***Material/Type***	***Equipment***	***Material/Type***	***Equipment***	***Material/Type***
☒ Protective clothing	Long Pants	☐ Full-face air-purifying respirator	Cartridge Type:	☐ SCBA (pressure demand)	
☒ Outer gloves	Nitrile Gloves	☐ Half-mask air-purifying respirator	Cartridge Type:	☐ Air-line System (pressure demand)	
☐ Outer boots		☐ Protective clothing		☐ Protective clothing	
☒ Hard hat**		☐ Outer gloves		☐ Outer gloves	
☒ Safety glasses**		☐ Inner gloves		☐ Inner gloves	
☒ Hard-toed boots**		☐ Outer boots		☐ Outer boots	
☒ Hearing protection**	Earplugs	☐ Hard hat**		☐ Hard hat**	
☒ Other:	Safety Vest	☐ Safety glasses**		☐ Hard-toed boots**	
		☐ Hard-toed boots**		☐ Hearing protection**	
		☐ Hearing protection**		☐ Escape respirator**	
		☐ Other:		☐ Safety “tag” rope**	
				☐ Other:	

* If checked, indicates initial level of PPE. Other completed columns indicate information to upgrade/downgrade.

** Optional as applicable

Attachment B-6

Decontamination Procedures and Equipment
– Modified Level D –

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥ ☐ ⑦ ☐ ⑧

Decontamination Solution*:* Alconox or equivalent and distilled water

Procedure		*Equipment Needed*
Station 1	Deposit equipment on plastic drop cloth, or in plastic containers lined with plastic trash bags	Various size containers, plastic trash bags, plastic drop cloth
Station 2	Scrub outer boot covers and gloves with decontamination solution	Containers (20 to 30 gal), decontamination solution, long-handled scrub brushes
Station 3	Rinse off decontamination solution from Station 2 using copious amounts of water	Containers (20 to 30 gal), water, long-handled scrub brushes
Station 4	Remove tape around boots and gloves and deposit in containers lined with plastic trash bag	Containers (20 to 30 gal), plastic trash bags
Station 5	Remove boot covers and outer gloves and deposit in containers lined with plastic trash bag	Containers (20 to 30 gal), plastic trash bags, bench or stool
Station 6	Remove splash suit. Deposit in container lined with plastic trash bag.	Containers (20 to 30 gal), plastic trash bags, bench or stool
Station 7	Remove inner gloves and deposit in container lined with plastic trash bag	Containers (20 to 30 gal), plastic trash bags

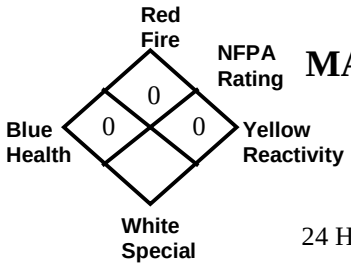
Attachment B-7

Material Safety Data Sheets

Applies to Task: ☐ ① ☐ ② ☒ ③ ☒ ④ ☒ ⑤ ☐ ⑥

Included in HASP	*Chemical*
☐	Acetone
☒	Alconox
☐	Ammonia
☒	Bentonite
☒	Diesel Fuel Oil No. 2-D
☒	Gasoline, Lead-free
☐	KB1
☐	*n*-Hexane
☐	Hydrochloric Acid
☐	Isopropyl Alcohol
☐	Nitric Acid
☐	Sodium Permanganate
☐	Sulfuric Acid, concentrated
☒	Other: Ammonium Perchlorate
☒	Other: Potassium Perchlorate
☐	Other:
☐	Other:

Alconox ®



MATERIAL SAFETY DATA SHEET

Alconox, Inc.
30 Glenn Street. Suite 309
White Plains, NY 10603

24 Hour Emergency Number – Chem-Tel (800) 255-3924

I. IDENTIFICATION

Product Name (as appears on label)	ALCONOX
CAS Registry Number:	Not Applicable
Effective Date:	January 1, 1999
Chemical Family:	Anionic Powdered Detergent
Manufacturer Catalog Numbers for sizes	1104, 1125, 1150, 1101, 1103 and 1112

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

There are no hazardous ingredients in ALCONOX as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

III. PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point (F):	Not Applicable
Vapor Pressure (mm Hg):	Not Applicable
Vapor Density (AIR=1):	Not Applicable
Specific Gravity (Water=1):	Not Applicable
Melting Point:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Not Applicable
Solubility in Water:	Appreciable-Soluble to 10% at ambient conditions
Appearance:	White powder interspersed with cream colored flakes.

IV. FIRE AND EXPLOSION DATA

Flash Point (Method Used):	None
Flammable Limits:	LEL: No Data UEL: No Data
Extinguishing Media:	Water, dry chemical, CO_2, foam
Special Fire fighting Procedures:	Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None

V. REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Incompatibility (Materials to Avoid):	None
Hazardous Decomposition or Byproducts:	May release CO_2 on burning

VI. HEALTH HAZARD DATA

Route(s) of Entry:	Inhalation? Yes Skin? No Ingestion? Yes
Health Hazards (Acute and Chronic):	Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Exposure may irritate mucous membranes. May cause sneezing.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggravated by powder.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs administer fluids. See a physician for discomfort.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	Material should be stored in a dry area to prevent caking.
Other Precautions:	No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

VIII. CONTROL MEASURES

Respiratory Protection (Specify Type):	Dust mask - Recommended
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are useful but not required.
Eye Protection:	Goggles are recommended when handling solutions.
Other Protective Clothing or Equipment:	None
Work/Hygienic Practices:	No special practices required

International Chemical Safety Cards

BENTONITE

ICSC: 0384

BENTONITE
Wilkinite

CAS # 1302-78-9
RTECS # CT9450000
ICSC # 0384

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
• **INHALATION**		Avoid inhalation of fine dust and mist.	
• **SKIN**		Protective gloves.	
• **EYES**		Safety spectacles.	
• **INGESTION**			

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting (extra personal protection: P1 filter respirator for inert particles).		

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0384

International Chemical Safety Cards

BENTONITE

ICSC: 0384

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** ODOURLESS GRANULES OR POWDER IN VARIABLE COLOUR. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance is a weak base in suspension in water. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of dust. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The substance may have effects on the lungs , resulting in silicosis due to the presence of crystalline silica (see ICSC # 0808).
PHYSICAL PROPERTIES	Relative density (water = 1): 2.5	Solubility in water: none
ENVIRONMENTAL DATA		

NOTES

Bentonites are aluminate silicate and can contain crystalline silica. The content varies widely from less than 1% to about 24%.

ADDITIONAL INFORMATION

ICSC: 0384 **BENTONITE**

Genium Publishing Corp.
One Genium Plaza
Schenectady, NY 12304-4690
(518) 377-8854

Material Safety Data Sheet Collection

Diesel Fuel Oil No. 2-D **MSDS No. 470**

Date of Preparation: 10/81 Revision: B, 3/98

Section 1 - Chemical Product and Company Identification 51

Product/Chemical Name: Diesel fuel oil no. 2-D
Chemical Formula: Unspecified or variable
CAS Number: 68334-30-5
Synonyms: automotive diesel oil; diesel fuel; diesel oil (medium); diesel oil no. 2; diesel oil (petroleum); diesel oils; diesel test fuel; fuels, diesel; no. 2 diesel oil; olej napeldowy III (Polish)
Derivation: Fuel oil may be a distilled fraction of petroleum, a residuum from refinery operations, a crude petroleum or a blend of two or more of these.
General Use: This medium viscosity residual fuel oil has both light and heavy grades, and is used in furnaces and boilers of utility and industrial power plants, ships, locomotives, and metallurgical operations.
Vendors: Consult the latest *Chemical Week Buyers' Guide.* (73)

Section 2 - Composition / Information on Ingredients

Diesel fuel oil no. 2-D, ca 100% vol; diesel fuels consist primarily of aliphatic (64% vol), aromatic (35% vol), and olefinic (1-2% vol) hydrocarbons.
Trace Impurities: May contain sulfur (< 0.5), benzene (<100 ppm), and additives such as sulfurized esters.

OSHA PEL
As petroleum distillates
8-hr TWA: 500 ppm (2000 mg/m^3)

ACGIH TLV
As diesel fuel
Notice of impending change (1997):
TWA: 100 mg/m^3, *Skin*

NIOSH REL
As petroleum distillates
10-hr TWA: 350 mg/m^3
Ceiling (15 min): 1800 mg/m^3

IDLH Level
As petroleum distillates
1,100 ppm

DFG (Germany) MAK
None established

Section 3 - Hazards Identification

ANSI Signal Word: Caution

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Diesel fuel oil no. 2-D is a brown, slightly viscous liquid with a kerosene-like odor. It is irritating to the skin and respiratory tract. Inhalation of mist or vapor may result in headache, nausea, vomiting, diarrhea, central nervous system (CNS) depression, tachycardia (rapid heart beat), cyanosis (blue coloration of skin due to oxygen deficiency), pulmonary edema (fluid in the lungs), and liver or kidney injury. Diesel fuel oil no. 2-D is an environmental hazard when spilled. When exposed to heat or flame, this flammable liquid is a fire hazard. When heated to decomposition, diesel fuel oil no. 2-D will emit acrid smoke and irritating vapors.

Wilson Risk Scale
R 1
I 2
S 2*
K 2
*Skin absorption

HMIS
H 1*
F 2
R 0
PPE†
*Chronic effects
†Sec. 8

Potential Health Effects

Primary Entry Routes: Inhalation, ingestion, skin contact/absorption
Target Organs: Skin, CNS, cardiovascular system (CVS), respiratory system, liver, kidneys
Acute Effects
Inhalation: Euphoria, respiratory irritation, cardiac dysrhythmia, increased respiration rates, cyanosis, pulmonary edema, hemoptysis (spitting up blood from the respiratory tract), respiratory arrest, renal (kidney) and liver injury, and CNS toxicity can result from inhalation of diesel fuel oil no. 2-D mist or vapor.
Eye: Contact may result in irritation.
Skin: Contact may cause irritation, systemic effects (see Inhalation), and block the sebaceous (oil) glands, resulting in a rash of acne-like pimples and spots, usually on the arms and legs.
Ingestion: Gastrointestinal irritation, vomiting, diarrhea, and in severe cases, CNS depression progressing to coma and death and other systemic effects (see Inhalation) can result. Aspiration can result in transient CNS depression or excitement, hypoxia, infection, pneumatocele (abnormal cavities in lungs) formation, and chronic lung dysfunction.
Carcinogenicity: IARC lists occupational exposure in petroleum refining as Group 2A (Probable human carcinogen) and distillate light (diesel) fuels as Group 3 (Not classifiable as to carcinogenicity to humans). ACGIH lists a notice of impending change for diesel fuels as TLV-A3 (Animal carcinogen). NTP and OSHA do not list diesel fuel oil no. 2-D as a carcinogen.

Medical Conditions Aggravated by Long-Term Exposure: None reported.

Chronic Effects: Prolonged or repeated skin contact causes dermatitis and possible systemic toxicity. Prolonged or repeated inhalation can cause CNS and peripheral nervous system damage.

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Eye Contact: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water for at least 15 minutes. Consult a physician or ophthalmologist if pain and/or irritation develops.

Skin Contact: Quickly remove contaminated clothing. Rinse with flooding amounts of water followed by washing the exposed area with soap and water. For reddened or blistered skin, consult a physician.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. Have the *conscious and alert* person drink 1 to 2 glasses of water. Contact a poison control center. Because of aspiration risk, *do not* induce vomiting unless the poison control center advises otherwise.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Gastric lavage is contraindicated due to aspiration risk. Instead, consider administration of charcoal or milk. If ingestion amount is large, gastric emptying in the alert patient can be accomplished through administration of Syrup of Ipecac. Treat overexposure symptomatically and supportively.

Section 5 - Fire-Fighting Measures

Flash Point: 100.4 °F (38 °C)

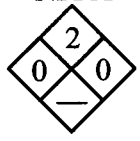
Flash Point Method: CC

Autoignition Temperature: 351-624 °F (177-329 °C)

LEL: 1.3% v/v

UEL: 75% v/v

NFPA



Flammability Classification: OSHA Class II Combustible Liquid

Extinguishing Media: Use dry chemical, carbon dioxide, foam, low velocity water fog or spray. Use a smothering technique to extinguish fire. Water may be ineffective in putting out a fire involving diesel fuel oil no. 2-D, and a solid water stream may spread the flames; however, a water spray may be used to cool fire-exposed containers, and flush spills away from ignition sources.

Unusual Fire or Explosion Hazards: Vapor or mist can form explosive mixtures in air. In still air, the heavier-than-air vapors of diesel fuel oil no. 2-D from a large source may travel along low-lying surfaces to distant sources of ignition and flash back to the material source. Containers may explode in heat of fire.

Hazardous Combustion Products: Heating diesel fuel oil no. 2-D to decomposition can produce acrid smoke and irritating vapors.

Fire-Fighting Instructions: *Do not* release runoff from fire control methods to sewers or waterways.

Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode.

Section 6 - Accidental Release Measures

Spill /Leak Procedures: Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Ground all equipment used when handling this product. *Do not* touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A fire fighting foam may be used to suppress vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material.

Small Spills: Absorb diesel fuel oil no. 2-D with vermiculite, earth, sand or similar material.

Large Spills

Containment: For large spills, consider downwind evacuation of at least 1000 ft (300 m). Dike far ahead of liquid spill for later disposal. *Do not* release into sewers or waterways.

Cleanup: Ground all equipment. Use non-sparking tools. Spills can be absorbed with materials such as peat, activated carbon, polyurethane foam, or straw. Sinking agents, gelling agents, dispersants, and mechanical systems can also be use to treat oil spills.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Avoid vapor or mist inhalation, and skin and eye contact. Use only with ventilation sufficient to reduce airborne concentrations to non-hazardous levels (see Sec. 2). Wear protective gloves (or use barrier cream), and clothing (see Sec. 8). Keep away from heat and ignition sources. Ground and bond all containers during transfers to prevent static sparks. Use non-sparking tools to open and close containers.

Storage Requirements: Store in tightly closed container in cool, well-ventilated area, away from heat, ignition sources and incompatibles (see Sec. 10). Periodically inspect stored materials. Equip drums with self-closing valves, pressure vacuum bungs, and flame arrestors.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.106) for Class II Combustible Liquid.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations.

Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations as low as possible. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls: Enclose operations and/or provide local exhaust ventilation appropriately designed for flammable mist and vapor at the site of chemical release. Where possible, transfer diesel fuel oil no. 2-D from drums or other storage containers directly to process containers. Minimize sources of ignition in surrounding low-lying areas.

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), use an SCBA.
Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Protective Clothing/Equipment: Wear chemically protective gloves, boots, aprons, and gauntlets. Wear protective eyeglasses, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses.

Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance and Odor: Brown, slightly viscous; kerosene-like odor
Odor Threshold: 0.7 ppm
Vapor Pressure: < 0.1 mm Hg at 68 °F (20 °C)
Vapor Density (Air=1): > 6
Formula Weight: N/A

Specific Gravity (H_2O=1, at 4 °C): < 0.86
Water Solubility: Insoluble
Boiling Point: 340-676 °F (171-358 °C)
Freezing Point: -29.2 °F (-34 °C)
Viscosity: 1.9-4.1 centistoke at 104 °F (40 °C)
Surface Tension: 23-32 dynes/cm at 68 °F (20 °C)

Section 10 - Stability and Reactivity

Stability: Diesel fuel oil no. 2-D is stable at room temperature in closed containers under normal storage and handling conditions.

Polymerization: Hazardous polymerization cannot occur.

Chemical Incompatibilities: Include strong oxidizing agents.

Conditions to Avoid: Exposure to heat and ignition sources.

Hazardous Decomposition Products: Thermal oxidative decomposition of diesel fuel oil no. 2-D can produce low molecular weight hydrocarbons, hydrocarbon derivatives, carbon oxides (CO_x), and sulfur oxides (SO_x).

Section 11- Toxicological Information

Acute Oral Effects:
Rat, oral, LD_{50}: 7500 mg/kg

Acute Dermal Effects:
Rabbit, skin, LD: > 5 mL/kg

Skin Effects:
Rabbit, skin, standard Draize test: 500 µL/24 hr, resulted in severe reaction.

Toxicity Data:*

Other Multiple Dose Toxicity Data:
Rat, inhalation: 2 g/m³/6 hr/3 weeks, intermittently, resulted in changes in blood erythrocyte (RBC) count, and focal fibrosis (pneumonoconiosis) and other changes in the lung, thorax or respiration.
Rat, inhalation: 400 µg/m³/16 hr/2.5 years, intermittently, caused other changes in the blood, and biochemical effects - transaminases.
Rabbit, skin: 80 mL/kg/12 days, continuously, resulted in other changes in the liver, kidney, ureter, and bladder, and death.

* See NIOSH, *RTECS* (HZ1800000), for additional toxicity data.

Section 12 - Ecological Information

Ecotoxicity: Juvenile American shad, salt water TLm: 204 mg/L/24 hr; mallard duck, LD_{50}=20 mg/kg.

Environmental Fate: Diesel fuel oil no. 2-D will evaporate from water or soil. In surface water, it may partition from the water column to suspended sediments.

Environmental Degradation: Biodegradation may occur in soil and water.

Section 13 - Disposal Considerations

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: Diesel fuel
Shipping Symbols: D
Hazard Class: 3
ID No.: NA1993
Packing Group: III
Label: None
Special Provisions (172.102): B1

Packaging Authorizations
a) Exceptions: 173.150
b) Non-bulk Packaging: 173.203
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger, Aircraft, or Railcar: 60 L
b) Cargo Aircraft Only: 220 L

Vessel Stowage Requirements
a) Vessel Stowage: A
b) Other: –

Section 15 - Regulatory Information

EPA Regulations:

Classified as RCRA Hazardous Waste (40 CFR 261.21): Characteristic of Ignitability
RCRA Hazardous Waste Number: D001
Listed as a CERCLA Hazardous Substance (40 CFR 302.4), Unlisted Hazardous Waste, Characteristic of Ignitability per RCRA Sec. 3001
CERCLA Final Reportable Quantity (RQ): 100 lb (45.4 kg)
SARA Toxic Chemical (40 CFR 372.65): Not listed
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed

OSHA Regulations:

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A, as petroleum distillates)

Section 16 - Other Information

References: 73, 103, 136, 190, 209, 222, 230, 231

Prepared By..... HM Spliethoff, MS
Industrial Hygiene Review..... PA Roy, MPH, CIH
Medical Review..... T Thoburn, MD, MPH

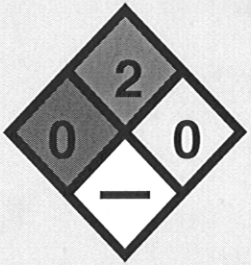
CAS # 68334-30-5

Warning! [1][3]

Flammable

Diesel Fuel Oil No. 2-D

diesel fuel



Brown, slightly viscous liquid; kerosene-like odor. Irritating to eyes/skin/respiratory tract. Also Causes: increased respiration rate, rapid heart beat, cyanosis; GI irritation, vomiting, diarrhea, CNS depression. Chronic Effects: dermatitis. Flammable.

Target Organs [3][9][10]

Skin | Respiratory System | Nervous System | Liver | Kidneys | Cardio-vascular

Personal Protective Equipment [8]

Goggles | Gloves | Apron

Check to see is respirator required

Emergency Procedures

First Aid [4]

Inhalation: Remove to fresh air and support breathing as needed. Eyes/Skin: Remove contaminated clothing. Flush eyes with plenty of water. Thoroughly wash skin with soap and water. Ingestion: Do not induce vomiting. Consult physician.

Fire [5]

Flammable. Can form explosive mixtures in the air. Use water as fog, dry chemical, or carbon dioxide. Do not use water spray as it may scatter fire.

Spills & Leaks [6]

Notify safety personnel, isolate and ventilate area, deny entry, stay upwind. Shut off ignition sources. Absorb with inert material, such as sand or vermiculite. Cleanup crew should protect against exposure.

Consult **MSDS 0470** for more information

Material Safety Data Sheet Collection
Genium Publishing Corp.
1171 RiverFront Center
Amsterdam, NY 12010
(518) 842-4111

Issue Date: 2000-07

Unleaded Gasoline
MSDS 467
AUT5000

Section 1 - Chemical Product and Company Identification 54.1

Material Name: Unleaded Gasoline **CAS Number:** 8006-61-9
Chemical Formula: Mixture of hydrocarbons
Synonyms: AUTOMOTIVE GASOLINE, LEAD-FREE; GASOLINE; MOTOR FUEL; MOTOR SPIRITS; NATURAL GASOLINE; PETROL; UNLEADED PETROL
General Use: Lead free motor fuel for internal combustion engines, 2-stroke and 4-stroke.

Section 2 - Composition / Information on Ingredients

Name	CAS	%
gasoline	8006-61-9	>90
benzene	71-43-2	5 max.

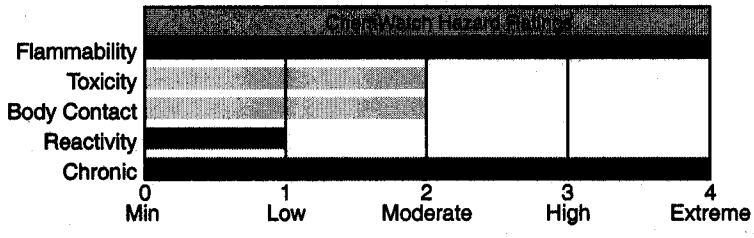
OSHA PEL
No data found.

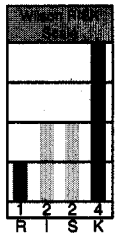
NIOSH REL
No data found.

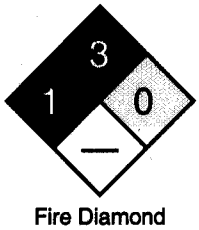
OSHA PEL Vacated 1989 Limits
TWA: 300 ppm; 900 mg/m^3;
STEL: 500 ppm; 1500 mg/m^3.

ACGIH TLV
TWA: 300 ppm; 890 mg/m^3;
STEL: 500 ppm; 1480 mg/m^3.

Section 3 - Hazards Identification







Fire Diamond

ANSI Signal Word
Danger!


Flammable

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Clear liquid; distinctive odor. Irritating to eyes/skin/respiratory tract. Also causes: dizziness, drunkenness, unconsciousness. Absorbed through skin. Chronic: dermatitis. Possible cancer hazard. Flammable. Can form explosive mixtures in air.

Potential Health Effects

Primary Entry Routes: inhalation, ingestion, skin contact
Target Organs: skin, eye, respiratory system, central nervous system (CNS)

Acute Effects

Inhalation: The vapor is discomforting to the upper respiratory tract and may be harmful if exposure is prolonged. Inhalation hazard is increased at higher temperatures. Acute effects from inhalation of high concentrations of vapor are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterized by headache and dizziness, increased reaction time, fatigue and loss of coordination. If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death. WARNING: Intentional misuse by concentrating/inhaling contents may be lethal. High inhaled concentrations of mixed hydrocarbons may produce narcosis characterized by nausea, vomiting and lightheadedness. Inhalation of aerosols may produce severe pulmonary edema, pneumonitis and pulmonary hemorrhage. Inhalation of petroleum hydrocarbons consisting substantially of low molecular weight species may produce irritation of mucous membranes, incoordination, giddiness, nausea, vertigo, confusion, headache, appetite loss, drowziness, tremors and anesthetic stupor. Massive exposures may produce central nervous system depression with sudden collapse and deep coma; fatalities have been recorded. Irritation of the brain and/or apneic anoxia may produce convulsions. Although recovery following overexposure is generally complete, cerebral micro- hemorrhage of focal post-inflammatory scarring may produce eleptiform seizures some months after the exposure. Pulmonary episodes may include chemical pneumonitis with edema and hemorrhage. The lighter hydrocarbons may produce kidney and neurotoxic effects. Liquid paraffins may produce anesthesia and depressant actions leading to weakness, dizziness, slow and shallow respiration, unconsciousness, convulsions and death. C_{5-7} paraffins may also produce polyneuropathy. Aromatic hydrocarbons accumulate in lipid-rich tissues (typically the brain, spinal cord and peripheral nerves) and may produce functional impairment manifested by nonspecific symptoms such as nausea, weakness, fatigue, vertigo; severe exposures may produce inebriation or unconsciousness. Many of the petroleum hydrocarbons are cardiac sensitizers and may cause ventricular fibrillations.

Eye: The liquid may produce eye discomfort and is capable of causing temporary impairment of vision and/or transient eye inflammation, ulceration. The vapor is discomforting to the eyes. Petroleum hydrocarbons may produce pain after direct contact with the eyes. Slight, but transient, disturbances of the corneal epithelium may also result. The aromatic fraction may produce irritation and lachrymation. The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

Skin: The material is moderately discomforting to the skin if exposure is prolonged. The material contains a component that may be absorbed through the skin and may cause drying of the skin, which may lead to dermatitis from repeated exposures over long periods. Toxic effects may result from skin absorption. Open cuts, abraded or irritated skin should not be exposed to this material. The material may accentuate any pre-existing dermatitis condition.

Ingestion: Considered an unlikely route of entry in commercial/industrial environments. The liquid may produce gastrointestinal discomfort and may be harmful if swallowed. Ingestion may result in nausea, pain and vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis. Ingestion of petroleum hydrocarbons may produce irritation of the pharynx, esophagus, stomach and small intestine with edema and mucosal ulceration. Resulting symptoms include a burning sensation in the mouth and throat. Large amounts may produce narcosis with nausea and vomiting, weakness or dizziness, slow and shallow respiration, swelling of the abdomen, unconsciousness and convulsions. Myocardial injury may produce arrhythmias, ventricular fibrillation and electrocardiographic changes. Central nervous system depression may also occur. Light aromatic hydrocarbons produce a warm, sharp, tingling sensation on contact with taste buds and may anesthetize the tongue. Aspiration into the lungs may produce coughing, gagging, and a chemical pneumonitis with pulmonary edema and hemorrhage.

Carcinogenicity: NTP - Not listed; IARC - Group 2B, Possibly carcinogenic to humans; OSHA - Not listed; NIOSH - Listed as carcinogen; ACGIH - Class A3, Animal carcinogen; EPA - Not listed; MAK - Not listed.

Chronic Effects: Chronic solvent inhalation exposures may result in nervous system impairment and liver and blood changes. Prolonged or continuous skin contact with the liquid may cause defatting with drying, cracking, irritation and dermatitis following. Chronic poisoning may occur from vapor inhalation or skin absorption. The most significant toxic effect is insidious and irreversible injury to the blood-forming tissue by benzene. Leukemia may develop. Chronic exposure may cause headache, fatigue, loss of appetite and lassitude with incipient blood effects including anemia and blood changes. Gasoline "sniffing" has caused severe nerve damage. Repeated or prolonged exposure to mixed hydrocarbons may produce narcosis with dizziness, weakness, irritability, concentration and/or memory loss, tremor in the fingers and tongue, vertigo, olfactory disorders, constriction of visual field, paresthesias of the extremities, weight loss and anemia and degenerative changes in the liver and kidney. Chronic exposure by petroleum workers to the lighter hydrocarbons has been associated with visual disturbances, damage to the central nervous system, peripheral neuropathies (including numbness and paresthesias), psychological and neurophysiological deficits, bone marrow toxicities (including hypoplasia, possibly due to benzene) and hepatic and renal involvement. Chronic dermal exposure to petroleum hydrocarbons may result in defatting which produces localized dermatoses. Surface cracking and erosion may also increase susceptibility to infection by microorganisms.

Section 4 - First Aid Measures

Inhalation: Remove to fresh air. Lay patient down. Keep warm and rested.
If breathing is shallow or has stopped, ensure clear airway and apply resuscitation. Transport to hospital, or doctor.

Eye Contact: Immediately hold the eyes open and wash continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids. Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: Immediately remove all contaminated clothing, including footwear (after rinsing with water). Wash affected areas thoroughly with water (and soap if available). Seek medical attention in event of irritation.

Ingestion: Contact a Poison Control Center. If swallowed, do NOT induce vomiting. Give a glass of water.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short term repeated exposures to petroleum distillates or related hydrocarbons:

1. Primary threat to life from pure petroleum distillate ingestion and/or inhalation is respiratory failure.
2. Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO_2 <50 mm Hg or pCO_2 >50 mm Hg) should be intubated.
3. Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
4. A chest x-ray should be taken immediately after stabilization of breathing and circulation to document aspiration and detect the presence of pneumothorax.
5. Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitization to catecholamines.

Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.

6. Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients.

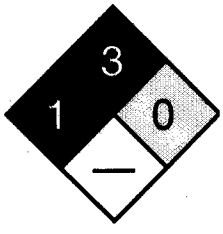
Section 5 - Fire-Fighting Measures

Flash Point: -43 °C

Autoignition Temperature: 280 °C

LEL: 1.4% v/v

UEL: 7.6% v/v



Fire Diamond

Extinguishing Media: Foam. Dry chemical powder. Bromochlorodifluoromethane (BCF) (where regulations permit). Carbon dioxide.

General Fire Hazards/Hazardous Combustion Products: Liquid and vapor are highly flammable. Severe fire hazard when exposed to heat, flame and/or oxidizers. Vapor forms an explosive mixture with air. Severe explosion hazard, in the form of vapor, when exposed to flame or spark. Vapor may travel a considerable distance to source of ignition. Heating may cause expansion/decomposition with violent rupture of containers. On combustion, may emit toxic fumes of carbon monoxide (CO).

Fire Incompatibility: Avoid contamination with oxidizing agents, i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc., as ignition may result.

Fire-Fighting Instructions: Alert fire department and tell them location and nature of hazard. May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or water ways. If safe, switch off electrical equipment until vapour fire hazard removed.

Use water delivered as a fine spray to control fire and cool adjacent area. Avoid spraying water onto liquid pools. Do not approach containers suspected to be hot. Cool fire exposed containers with water spray from a protected location. If safe to do so, remove containers from path of fire.

Section 6 - Accidental Release Measures

Small Spills: Remove all ignition sources. Clean up all spills immediately. Avoid breathing vapors and contact with skin and eyes. Control personal contact by using protective equipment. Contain and absorb small quantities with vermiculite or other absorbent material. Wipe up. Collect residues in a flammable waste container.

Large Spills: Clear area of personnel and move upwind. Alert fire department and tell them location and nature of hazard. May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or water ways. No smoking, naked lights or ignition sources. Increase ventilation. Stop leak if safe to do so.

Water spray or fog may be used to disperse/absorb vapor. Contain spill with sand, earth or vermiculite. Use only spark-free shovels and explosion proof equipment. Collect recoverable product into labeled containers for recycling. Absorb remaining product with sand, earth or vermiculite. Collect solid residues and seal in labelled drums for disposal. Wash area and prevent runoff into drains.

If contamination of drains or waterways occurs, advise emergency services.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Avoid generating and breathing mist. Avoid all personal contact, including inhalation. Wear protective clothing when risk of exposure occurs. Use in a well-ventilated area. Prevent concentration in hollows and sumps. DO NOT enter confined spaces until atmosphere has been checked. Avoid smoking, bare lights, heat or ignition sources. When handling, DO NOT eat, drink or smoke. Vapor may ignite on pumping or pouring due to static electricity. DO NOT use plastic buckets. Ground and secure metal containers when dispensing or pouring product. Use spark-free tools when handling. Avoid contact with incompatible materials. Keep containers securely sealed. Avoid physical damage to containers. Always wash hands with soap and water after handling. Work clothes should be laundered separately. Use good occupational work practices. Observe manufacturer's storing and handling recommendations. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

Recommended Storage Methods: Metal can, metal drum. Packing as recommended by manufacturer. Check all containers are clearly labeled and free from leaks.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: CARE: Use of a quantity of this material in confined space or poorly ventilated area, where rapid build-up of concentrated atmosphere may occur, could require increased ventilation and/or protective gear. Use in a well-ventilated area. If inhalation risk of overexposure exists, wear a NIOSH approved organic-vapor respirator. Correct respirator fit is essential to obtain adequate protection. In confined spaces where there is inadequate ventilation, wear full-face air supplied breathing apparatus. Provide adequate ventilation in warehouse or closed storage areas.

Personal Protective Clothing/Equipment

Eyes: Safety glasses with side shields; or as required, chemical goggles.
Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Barrier cream with polyethylene gloves or PVC gloves. Safety footwear. Do NOT use this product to clean the skin.

Respiratory Protection:
Exposure Range >300 to 1000 ppm: Air Purifying, Negative Pressure, Half Mask
Exposure Range >1000 to 15,000 ppm: Air Purifying, Negative Pressure, Full Face
Exposure Range >15,000 to 300,000 ppm: Supplied Air, Constant Flow/Pressure Demand, Full Face
Exposure Range >300,000 to unlimited ppm: Self-contained Breathing Apparatus, Pressure Demand, Full Face
Cartridge Color: black

Other: Overalls. Ensure that there is ready access to eye wash unit. Ensure there is ready access to an emergency shower.

Section 9 - Physical and Chemical Properties

Appearance/General Info: Purple, highly flammable, volatile liquid with characteristic sharp odor. Floats on water. Consists of a complex mixture of hydrocarbons with small amounts of residual benzene from the refining operations.

Physical State: Liquid
Vapor Pressure (kPa): 53.33 at 20 °C
Vapor Density (Air=1): > 2
Formula Weight: Not applicable.
Specific Gravity (H_2O=1, at 4 °C): 0.72-0.735 at 15 °C
Water Solubility: Insoluble
Evaporation Rate: Fast

pH: Not applicable
pH (1% Solution): Not applicable.
Boiling Point Range: 38.89 °C (102 °F)
Freezing/Melting Point Range: Not available
Volatile Component (% Vol): 100
Decomposition Temperature (°C): Not available.

Section 10 - Stability and Reactivity

Stability/Polymerization: Presence of incompatible materials. Product is considered stable. Hazardous polymerization will not occur.

Storage Incompatibilities: Avoid storage with oxidizers.

Section 11 - Toxicological Information

Unless otherwise specified, data extracted from RTECS - Registry of Toxic Effects of Chemical Substances

TOXICITY
Oral (rat) LD50: 18800 mg/kg

IRRITATION
Skin (rabbit): 500 mg/24h mild

Section 12 - Ecological Information

Environmental Fate: No data found.
Ecotoxicity: No data found.
Biochemical Oxygen Demand (BOD): 8%, 5 days

Section 13 - Disposal Considerations

Disposal: Consult manufacturer for recycling options and recycle where possible. Follow all applicable federal, state, and local laws. Incinerate residue at an approved site. Recycle containers where possible, or dispose of in an authorized landfil.
BEWARE: Empty solvent, paint, lacquer and flammable liquid drums present a severe explosion hazard if cut by flame torch or welded. Even when thoroughly cleaned or reconditioned, the drum seams may retain sufficient solvent to generate an explosive atmosphere in the drum.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: MOTOR SPIRIT OR GASOLINE OR PETROL
Hazard Class: 3.1
ID No.: 1203
Packing Group: II
Label: Flammable Liquid[3]

Additional Shipping Information: PETROL

Section 15 - Regulatory Information

EPA Regulations:
RCRA 40 CFR: Not listed
CERCLA 40 CFR 302.4: Not listed
SARA 40 CFR 372.65: Not listed
SARA EHS 40 CFR 355: Not listed
TSCA: Listed

Section 16 - Other Information

Research Date: .....1999-11 **Review Date:** 2000-07

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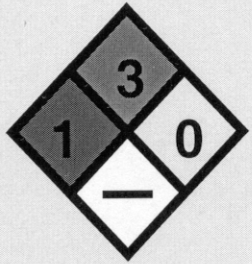
CAS # 8006-61-9 **Danger!** [1] [3]

Flammable

Gasoline

gasolene; motor spirits; natural gasoline; petrol

Clear liquid; distinctive odor. Irritating to eyes/skin/respiratory tract. Also Causes: dizziness, drunkenness, unconsciousness. Absorbed through skin. Chronic: dermatitis. Possible cancer hazard. Flammable. Can form explosive mixtures in air.



Target Organs [3] [9] [10]

Eyes, Skin, Respiratory System, Nervous System, Liver, Kidneys

Personal Protective Equipment [8]

Goggles, Gloves, Apron

Check to see is respirator required?

Emergency Procedures

First Aid [4]

Inhalation: Remove to fresh air and support breathing as needed. Eyes/Skin: Remove contaminated clothing. Flush with plenty of water for at least 15 min. Thoroughly wash skin with soap and water. Ingestion: Do not induce vomiting! Consult physician.

Fire [5]

Flammable. Can form explosive mixtures in the air. Use dry chemical, carbon dioxide, or foam. Water may be ineffective for extinguishment, but should be used to knock-down vapors and cool containers.

Spills & Leaks [6]

Notify safety personnel, isolate and ventilate area. Shut off ignition sources. Take up with inert material such as sand or vermiculite. Do not release to sewers or waterways. Cleanup crew should protect against exposure.

Consult MSDS 0467 for more information

MSDS - AMMONIUM PERCHLORATE

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: AMMONIUM PERCHLORATE
Ingredient Sequence Number: 01
Percent: 99.5MIN
NIOSH (RTECS) Number: SC7520000
CAS Number: 7790-98-9
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: 5MG/CUM,AS RESP DUST

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Physical/Chemical Characteristics

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Appearance And Odor: ODORLESS WHITE GRANULAR CRYSTALS.
Melting Point: 842F/450C
Specific Gravity: 1.95
Decomposition Temperature: >150F,>66C
Solubility In Water: APPRECIABLE
Magnetism (Milligauss): N/P
Corrosion Rate (IPY): UNKNOWN

==========

Fire and Explosion Hazard Data

==========

Flash Point Method: N/P
Extinguishing Media: WATER SPRAY, FOAM.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA IN AN ENCLOSED
AREA.
Unusual Fire And Expl Hazrds: COOL W/WATER FOR LARGE FIRE IN STORAGE AREA,
USE UNMANNED HOSE HOLDER OR WITHDRAW & LET BURN! SEE SUP

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Reactivity Data

==========

Stability: NO
Cond To Avoid (Stability): STABLE BELOW 150 F.DECOMP OR EXPLODES AT HIGHER
TEMP.
Materials To Avoid: COMBUSTIBLES,OXIDIZERS CREATE EXTREME FIRE/EXPL HAZARD.
Hazardous Decomp Products: VAPORS OF CHLORINE,HYDROGEN CHLORIDES, AMMONIA,OXIDES OF NITROGEN.
Hazardous Poly Occur: NO

Health Hazard Data

LD50-LC50 Mixture: 4200 MG/KG(RAT) & 1900MG/KG (RABBIT)
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE:MILD IRRITANT TO THE SKIN,EYES,MUCOUS
MEMBRANES,RESPIRATORY OR G.I. TRACT,REDNESS OF EYES AND SKIN. CHRONIC:SKIN,
G.I. OR RESPIRATORY DISORDERS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: PER MSDS DATA.
Signs/Symptoms Of Overexp:
EYE:IRRT,REDNESS.SKIN:IRRT,REDNESS.INHL:URT
IRRT.INGEST: GI TRACT IRRT,DIARR.
Med Cond Aggravated By Exp: PRE-EXISTING CONDITIONS MAY BE WORSEN.
Emergency/First Aid Proc: INHAL:RMV TO FRESH AIR. IF NOT BRTHNG GIVE CPR;
IF BRTHNG DIFF GIVE OXYGEN. EYE:IMMED FLUSH W/PLENTY OF WATER. SKIN: WASH
W/SOAP&WATER. RMV CONTAM CLTHG&SHOES. INGEST:INDUCE VOMIT. RPT UNTIL VOMIT
IS CLEAR. NOTHG BY MOUTH IF UNCONSC. GET MEDICAL ATTN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: SCOOP UP OR ABSORB WITH NONCOMBUSTIBLE ABSORBENT(VERMICULITE).

Waste Disposal Method: EPA HAZWASTE D001. DISPOSE AS HAZWASTE IAW ALL LAWS
& REGS.
Precautions-Handling/Storing: DO NOT ALLOW CONTACT W/COMBUSTIBLE MATERIALS.STORE IN ORIGINAL CLOSED CONTAINERS.HANDLE CONTAINERS CAREFULLY.
AVOID INHL DUST & EYE/SKN CONTACT.
Other Precautions: PROVIDE WATER FILLED JUMP TANK OR SAFETY SHOWER.WASH
CONTAM CLOTHING PROMPTLY

==========

Control Measures

==========

Respiratory Protection: USE NIOSH/MSHA APPROVED RESPIRATOR FOR DUST IF
ABOVE PEL/TLV.
Ventilation: LOCAL OR GENERAL AS REQD.
Protective Gloves: IMPERVIOUS
Eye Protection: SAFETY GLASSES OR GOGGLES
Other Protective Equipment: WEAR PROTECTIVE CLOTHING, RUBBER BOOTS. DO NOT
WEAR LEATHER.
Work Hygienic Practices: AVOID CONTACT WITH EYES AND SKIN;DO NOT BREATHE
DUST/MIST;KEEP FROM CONTACT WITH CLOTHING & OTHER COMBUSTIBLE MATERIAL.
Suppl. Safety & Health Data: .

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Transportation Data

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Trans Data Review Date: 87075
DOT PSN Code: ASD
DOT Proper Shipping Name: AMMONIUM PERCHLORATE
DOT Class: 5.1
DOT ID Number: UN1442
DOT Pack Group: II
DOT Label: OXIDIZER
IMO PSN Code: AZZ
IMO Proper Shipping Name: AMMONIUM PERCHLORATE
IMO Regulations Page Number: 5126
IMO UN Number: 1442
IMO UN Class: 5.1

IMO Subsidiary Risk Label: -
IATA PSN Code: BQC
IATA UN ID Number: 1442
IATA Proper Shipping Name: AMMONIUM PERCHLORATE
IATA UN Class: 5.1
IATA Label: OXIDIZER
AFI PSN Code: BQC
AFI Prop. Shipping Name: AMMONIUM PERCHLORATE
AFI Class: 5.1
AFI ID Number: UN1442
AFI Pack Group: II
AFI Label: OXIDIZER
AFI Special Prov: A9
AFI Basic Pac Ref: 9-10
==========

Disposal Data

==========
Disposal Data Review Date: 88229
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 002
Landfill Ban Item: YES
Disposal Supplemental Data: MSDS DTD JUN85.FIRE(CONT):EVACUATE AREA,DENY
ENTRY.USE SCBA PP MODE, FULL PROTECTIVE CLOTHING. IN CASE OF ACCIDENTAL
EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: D001
1st EPA Haz Wst Name New: IGNITIBLE
1st EPA Haz Wst Char New: IGNITABILITY
1st EPA Acute Hazard New: NO
2nd EPA Haz Wst Code New: D003
2nd EPA Haz Wst Name New: REACTIVE
2nd EPA Haz Wst Char New: REACTIVITY
2nd EPA Acute Hazard New: NO
==========

Label Data

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Label Required: YES
Technical Review Date: 10JAN91
Label Date: 01JUN85
MFR Label Number: UNKNOWN

Label Status: M
Common Name: AMMONIUM PERCHLORATE
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-Severe: X
Special Hazard Precautions: ACUTE-MINOR IRRITANT TO
EYE,SKIN,RESPIRATORY &
GI TRACT.CHRONIC-SKIN,GI OR RESPIRATORY DISORDERS.STORAGE-
DANGER!STRONG
OXIDIZER-CONTACT WITH COMBUSTIBLE OR OXIDIZABLE MATERIAL
CONSTITUTES AN
EXTREME FIRE & EXPLOSION HAZARD.CONTAMINATED CLOTHING &
ORGANIC METERIALS
ARE DANGEROUSLY FLAMMABLE.ALWAYS HAVE A WATER FILLED JUMP
TANK OR DELUGE
SHOWER NEARBY.IF YOUR CLOTHING CATCHES FIRE,DON'T USE A FIRE
BLANKET.USE
THE JUMP TANK OR DELUGE SHOWER.DON'T WEAR LEATHER
MATERIALS.STORE
CONTAINERS TIGHTLY CLOSED.FIRST AID-CALL A DOCTOR.EYE:FLUSH
W/WATER FOR 15
INDUCE VOMITING.GIVE WATER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y

MSDS Number: **P5983** * * * * * *Effective Date:* ***11/02/01*** * * * * * *Supercedes:* ***11/17/99***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker®

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

POTASSIUM PERCHLORATE

1. Product Identification

Synonyms: Perchloric acid, potassium salt; Potassium hyperchloride
CAS No.: 7778-74-7
Molecular Weight: 138.55
Chemical Formula: KCl04
Product Codes: 3220

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Potassium Perchlorate	7778-74-7	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES SEVERE IRRITATION TO EYES, SKIN AND RESPIRATORY TRACT. AFFECTS KIDNEYS AND BLOOD.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Yellow (Reactive)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. High concentrations can cause pulmonary edema. Absorption through inhalation of dust can produce systemic effects paralleling those from ingestion exposure.

Ingestion:
Irritant to mucous membrane; causes gastro-intestinal upset, and larger doses can cause nausea, vomiting, fever, rashes. Reduces oxygen to body organs (methemoglobinemia) causing the lips and skin to turn blue. Exposure causes a breakdown of red blood cells, which can lead to kidney damage. May affect bone marrow (aplastic anemia).

Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May cause burns to skin tissue upon contact.

Eye Contact:
Causes irritation, redness, and pain. May cause burns.

Chronic Exposure:
Chronic exposure may affect red blood cells which can have an effect on the liver, kidney and other organs.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Contact with oxidizable substances may cause extremely violent combustion. Liberates toxic gases when involved in a fire.
Explosion:
Strong oxidants may explode when shocked, or if exposed to heat, flame, or friction. Also may act as initiation source for dust or vapor explosions. Containers may explode when involved in a fire. Sensitive to mechanical impact.
Fire Extinguishing Media:
Flood with large amounts of water.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container.

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7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage and moisture. Isolate from any source of heat or ignition. Avoid storage on wood floors. Separate from incompatibles, combustibles, organic or other readily oxidizable materials. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
15 mg/m3 total dust, 5 mg/m3 respirable fraction for nuisance dusts.
- ACGIH Threshold Limit Value (TLV):
10 mg/m3 total dust containing no asbestos and < 1% crystalline silica for Particulates Not Otherwise Classified (PNOC).

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
White powder.
Odor:
Odorless.
Solubility:
1.5 g in 100 g of water.
Density:
2.52
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
400C (752F)
Melting Point:
610C (1130F)
Vapor Density (Air=1):
4.8
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Chlorine and oxides of potassium.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Aluminum, magnesium, charcoal, fluorine, sulfur, many combustible substances and reducing agents.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

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11. Toxicological Information

Investigated as a reproductive effector.
--------\Cancer Lists\----------
---NTP Carcinogen---

Ingredient	Known	Anticipated	IARC Category
Potassium Perchlorate (7778-74-7)	No	No	None

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12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: POTASSIUM PERCHLORATE
Hazard Class: 5.1
UN/NA: UN1489
Packing Group: II
Information reported for product/size: 275LB

International (Water, I.M.O.)

Proper Shipping Name: POTASSIUM PERCHLORATE
Hazard Class: 5.1
UN/NA: UN1489
Packing Group: II
Information reported for product/size: 275LB

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15. Regulatory Information

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  --------\Chemical Inventory Status - Part 1\------------------------
--------
  Ingredient                                        TSCA  EC   Japan
Australia
  ------------------------------------------------  ----  ---  -----  --
-------
  Potassium Perchlorate (7778-74-7)                  Yes  Yes   Yes
Yes

  --------\Chemical Inventory Status - Part 2\------------------------
--------
                                                                --Canada--
  Ingredient                                        Korea  DSL   NDSL
Phil.
  ------------------------------------------------  -----  ---   ----  -
----
  Potassium Perchlorate (7778-74-7)                  Yes   Yes   No
Yes

  --------\Federal, State & International Regulations - Part 1\--------
--------
                                                -SARA 302-    ------SARA
313------
  Ingredient                                    RQ    TPQ     List
Chemical Catg.
  ----------------------------------------  ---   -----   ----  ------
--------
  Potassium Perchlorate (7778-74-7)         No    No      No
No

  --------\Federal, State & International Regulations - Part 2\--------
--------
                                                              -RCRA-    -
TSCA-
  Ingredient                                CERCLA     261.33     8(d)
  ----------------------------------------  ------     ------    -----
-
  Potassium Perchlorate (7778-74-7)         No         No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: Yes         (Pure / Solid)
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Australian Hazchem Code: 2W
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **2** Other: **Oxidizer**

Label Hazard Warning:

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES SEVERE IRRITATION TO EYES, SKIN AND RESPIRATORY TRACT. AFFECTS KIDNEYS AND BLOOD.

Label Precautions:

Keep from contact with clothing and other combustible materials.
Store in a tightly closed container.
Do not store near combustible materials.
Remove and wash contaminated clothing promptly.
Avoid contact with eyes, skin and clothing.
Avoid breathing dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

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